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GENETIC STUDIES OF GENIUS

VOLUME I

GENETIC STUDIES OF GENIUS

VOLUME I

MENTAL AND PHYSICAL TRAITS OF A THOUSAND GIFTED CHILDREN

LEWIS M. TERMAN

Assisted by

BIRD T. BALDWIN
EDITH BRONSON
JAMES C. DEVOSS
FLORENCE FULLER
FLORENCE L. GOODENOUGH
TRUMAN LEE KELLEY
MARGARET LIMA
HELEN MARSHALL
ALBERT H. MOORE
A. S. RAUBENHEIMER
G. M. RUCH
RAYMOND L. WILLOUGHBY
JENNIE BENSON WYMAN
DOROTHY HAZELTINE YATES

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PREFACE

It should go without saying that a nation's resources of intellectual talent are among the most precious it will ever have. The origin of genius, the natural laws of its development, and the environmental influences by which it may be affected for good or ill, are scientific problems of almost unequaled importance for human welfare. Many philosophers and scientists, from Plato and Aristotle to the present day, have recognized the truth of this. A number of factors, however, have worked together to postpone until our own time the inauguration of research in this field. Among these may be mentioned the following: (1) the influence of current beliefs, partaking of the nature of superstitions, regarding the essential nature of the Great Man, who has commonly been regarded by the masses as qualitatively set off from the rest of mankind, the product of supernatural causes, and moved by forces which are not to be explained by the natural laws of human behavior; (2) the widespread belief, hardly less superstitious in its origin, that intellectual precocity is pathological; (3) the vigorous growth of democratic sentiment in Western Europe and America during the last few hundred years, which has necessarily tended to encourage an attitude unfavorable to a just appreciation of native individual differences in human endowment; and (4) the tardy birth of the biological sciences, particularly genetics, psychology, and education.

The publication of Galton's *Hereditary Genius,* in 1869, marks the beginning of a new era. Since that date the interest in individual differences and their causes has grown until these promise to become national issues on such problems as selective immigration, the evils of differential birth rates, special training for the gifted, and the economic reward of creative talent. Both scientific and popular interest along these lines has been greatly intensified by recent developments in the psychological methods of measuring intelligence, which have furnished conclusive proof that native differences in endowment are a universal phenomenon and that it is possible to evaluate them. Educators, especially, have been quick to appreciate the practical significance of

such differences, first for the training of backward and defective children and more recently for the education of the gifted. Twice in the last four years the National Society for the Study of Education has devoted a yearbook to the gifted child.[1]

The problems of genius are chiefly three: its nature, its origin, and its cultivation. This volume is concerned primarily with the nature of genius, insofar as this is indicated by the mental and physical traits of intellectually superior children. On the origin of such children it has only a few facts of rather general nature to present, for it has thus far not been possible to make a thoroughgoing study of the heredity of our subjects. On the education of the gifted it is hoped that the data presented throw considerable light, since educational procedure to be sound must always be based upon an analysis of the raw material with which it deals. Before the present investigation was undertaken, no large group of gifted children had ever been studied. Our positive knowledge of the physical, mental, and personality traits of such children has been extremely limited, and until this knowledge is available there can be no basis for intelligent educational procedure. It is hardly too much to say that this field at present is the "Darkest Africa" of education. To what extent genius can be created or destroyed by right or wrong training is entirely unknown.

The purpose of the present investigation has been, therefore, to determine in what respects the typical gifted child differs from the typical child of normal mentality. Data have been collected on more than 1,400 children, each of whom ranks well within the top one per cent of the unselected school population of corresponding age. The greater part of this report, however, is devoted to 643 such children who constitute a typical group for whom the data at hand are most extensive. Less extensive material is reported for a second group of 309 subjects (Chapter XIX), making a total, in round numbers, of nearly 1,000 gifted subjects for whom data have been analyzed. On many points control data have been secured for 600 to 800 unselected chil-

[1] *Nineteenth Yearbook*, Part II, 1920, pp. 125: Classroom Problems in the Education of Gifted Children, by T. S. Henry, edited by G. M. Whipple. Also, the *Twenty-third Yearbook*, Part I, 1924, pp. 443: The Education of Gifted Children, edited by G. M. Whipple.

dren. The aim has been to collect, so far as possible, information of objective nature, although it has not seemed wise to reject, altogether, methods subject to the influence of the personal equation. In the main, however, the conclusions are based upon well defined experimental procedures which can be repeated ad libitum for purposes of verification or refutation. Whatever erroneous conclusions have been drawn from the data at hand, and it would be vain to hope that such have been altogether avoided, should in time be corrected.

To Miss Florence Goodenough, who served for one year as chief field assistant and for two years as chief research assistant, the author's indebtedness is very great; also to Professor Truman Lee Kelley, for his assistance in the statistical treatment of data. To the entire staff, whose names will be found on the title page of this book, the author expresses his deep obligations. Last, but far from least, he would express his gratitude and thanks for the hearty spirit of coöperation which has been almost universally shown by the parents, teachers, and school officials. But for their willing sacrifices of time and labor in the collection of data, the investigation would have been entirely impossible.

In Volume II Dr. Catharine M. Cox sets forth the results of a parallel study of *The Early Mental Traits of Three Hundred Geniuses*. It is believed that the two volumes will yield many interesting and instructive comparisons.

Two other publications should be mentioned which supplement these *studies*. They are: (1) *Children's Reading; A Guide for Parents and Teachers,* by Lewis M. Terman and Margaret Lima (Appleton, 1925); (2) *An Experimental Study of Some of the Behavior Traits of the Potentially Delinquent Boy,* by Dr. A. S. Raubenheimer (Psychological Monographs, 1925). These, like the present volumes, were made possible by appropriations from the Commonwealth Fund.

LEWIS M. TERMAN.

Stanford University,
January 15, 1925.

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MENTAL AND PHYSICAL TRAITS OF A THOUSAND GIFTED CHILDREN

CHAPTER I

HISTORY AND DESCRIPTION OF THE INVESTIGATION

Preliminary Exploration

This research may be said to have had its beginning during the years of the writer's graduate study, 1902–1905. He first became interested in the psychology of genius in a study of leadership which he made in 1902–1903 under the direction of Professor E. H. Lindley, of Indiana University.[1] While a student at Clark University he reviewed in 1903–1904 the medical-psychological literature on precocious children[2] and the following year carried out as a doctor's dissertation an experimental study of some of the mental processes of seven bright and seven dull boys.[3]

However slight the positive contribution of these studies, they at least introduced their author to the literature on the psychology of genius and gave a keen realization of the fact that the field was a promising one for experimental investigation. When in 1910 it became possible for the writer to return to the problem, the progress which Binet and others had made in the field of mentality testing had created an entirely new situation. For certain ages, at least, it was at last possible to determine with some degree of approximation the brightness of a given child, compared with that of unselected children of his own age.

The importance of Binet's work for later studies of intelligence can hardly be overestimated. It has not yet received and possibly may never receive from psychologists

[1]A Preliminary Study in the Psychology and Pedagogy of Leadership. *Pedagogical Seminary*, 1904, Vol. 11, pp. 413–451.

[2]A Study in Precocity and Prematuration. *American Journal of Psychology*, 1905, Vol. 16, pp. 145–163.

[3]Genius and Stupidity: A Study of Some of the Intellectual Processes of Seven "Bright" and Seven "Stupid" Boys. *Pedagogical Seminary*, 1906, Vol. 13, pp. 307–373.

the appreciation which it deserves. Critical ability, unfortunately, is far more common than ability to create, and to the critical psychologist the imperfections and crudities of Binet's methods, both in their practical and in their theoretical aspects, have often been more evident than their remarkable originality. More than anyone else, it was Binet who taught us where to search among mental functions for significant intellectual differences. It was he who gave us our first successful intelligence scale and demonstrated the actuality of an age development through successive "hierarchies of intelligences." That the term "mental age" which resulted from the latter concept has often been misinterpreted and misused, does not detract from the importance of his contribution. The fact is that previous to the publication of Binet's 1908 scale the significance of age differences in intelligence was very little understood. Psychologists were not aware of the extraordinary and detailed similarity that may exist between a dull child of twelve years and a normal average child of eight. No one recognized the significance, for future mental development, of a given degree of retardation or acceleration. As one who had worked experimentally upon the diagnosis of intellectual differences in the pre-scale period, the present writer had perhaps more reason than most psychologists to appreciate the value of Binet's contribution. He is willing to admit that after spending four or five hours a day for several months in administering an extended series of well selected intelligence tests individually to fourteen boys, he was unable, notwithstanding the large individual differences in performance which these tests clearly revealed, to render a judgment as to the prognostic significance of the differences found. By the Binet scale it would have been possible to make a more meaningful diagnosis after a one-hour test of each child; and it would now even be possible to do so after a single hour spent in testing the fourteen boys by a group test. This advance is due (1), to the demonstrated validity of the concepts of mental "retardation" and mental "acceleration;" and (2), to the convenient and readily comprehensible method suggested by Binet for evaluating degrees of retardation and acceleration in terms of normal mental age units. Previous to 1908 it was impossible for any psychologist, after devoting any amount of time to intelligence tests of ten or

twenty children of different ages, to make a valid comparison of the intellectual abilities found. This is now possible for even a well-trained normal school graduate.

The value of the Binet method in the identification of the intellectually gifted became immediately evident to the writer when with Mr. H. G. Childs he made trial of the 1908 scale. It was obvious that children who showed marked acceleration in mental age were, by any reasonable criterion, brighter than children who tested at or below their chronological age. A little later Stern's suggestion looking toward the use of an intelligence ratio, or quotient, refined still further the method of Binet and made possible more accurate comparisons of children of different ages.[1]

In 1911 more or less systematic work was begun at Stanford University in the collection of data on children who had made exceptionally high scores in a mental test. In 1913–1914 three schools in San Francisco were sifted for bright children, and in 1915 certain data were published on 31 cases testing above 125 intelligence quotient (IQ).[2] Ratings on several traits were secured from the teachers, who also filled out a brief information schedule for each child. Some of the results of this explorative study were out of line with the writer's expectations and in contradiction to earlier views which he had published on the supposed evils of precocity.[3] It was obvious that these children did not, as a group, possess the traits which had been popularly supposed to characterize intellectually precocious children, such as sickliness, eccentricity, one-sidedness, and lack of social adaptability. In passing it may be noted that one of the bright children tested in 1911 has taken his Ph.D. degree and is (1924) an instructor in a great western university; that another has just completed his work for the degree of Sc.D.; and that another is studying in the universities of Europe.

In 1916 the methods used were considerably revised. The teacher's information schedule was enlarged, a similar information schedule was prepared for the parent to fill out, and ratings on twenty traits were secured both from

[1]W. Stern: Die psychologischen Methoden der Intelligenzprüfungen und deren Anwendung an Schulkindern. Sonderabdr. aus *Bericht über den V Kongress f. experimentelle Psychologie,* Leipzig, 1912.

[2]Lewis M. Terman: The Mental Hygiene of Exceptional Children. *Pedagogical Seminary,* 1915, Vol. 22, p. 534 ff.

[3]*American Journal of Psychology,* 1905, Vol. 16, pp. 145–183.

parents and from teachers. With the assistance of Margaret Hopwood Hubbard, data were collected on 59 cases, most of whom had an intelligence quotient above 140. The main results of this study have been published elsewhere and need not be summarized here.[1] The writer's tentative conclusions of 1915 were fully supported.

The establishment by Stanford University of a research fellowship for the study of gifted children, in 1919, was the occasion for further revision of method and a stimulus to renewed search for cases. The information schedules were materially improved and an interest blank was arranged for the child to fill out. By the spring of 1921 approximately 150 cases testing for the most part above 140 IQ had been located, and for 121 considerable supplementary data had been secured. The results for these 121 cases have not been published, but it may be stated that they suggested the following tentative conclusions:

1. There is probably a somewhat higher incidence of intellectual superiority among boys than among girls.
2. In physical growth and general health gifted children as a group excel unselected children of the same age.
3. Gifted children who attend school are on the average accelerated about a year and a half, compared with unselected children, but on an average they are about two grades below that which corresponds to their mental development.
4. Only a very small minority of intellectually gifted children have been subjected to forced culture or otherwise "pushed" in their development.
5. Heredity is superior. Fifty per cent of the fathers belong to the professional groups; not one to the unskilled group.
6. There is an apparent excess of Jewish cases and a deficiency of cases from the Italian, Portuguese, and Mexican groups living in the vicinity of Stanford University.
7. Trait ratings and social data give no evidence that gifted children tend more often than others to be lacking in social adaptability or leadership. However, they are probably less superior in social, emotional, and psychophysical traits than in intellectual and volitional traits.

[1]Lewis M. Terman: *The Intelligence of School Children.* Houghton Mifflin Company, 1919. See pp. 165–267.

During the academic year 1920–21, Mrs. Jessie Chase Fenton served as full time assistant on the gifted children fellowship. Her services did much to lay the foundation for the more extensive investigation which was to follow. Besides collecting considerable data on the social traits of a group of 100 intellectually superior children, she assisted in the preparation of a report on a gifted young poet,[1] and in a summary of recent literature on genius.[2]

Perhaps the most valuable thing gained from the work to this point was the experience. Intimate acquaintance with a considerable number of gifted children had shown the need of certain kinds of home and school data, and successive revisions of information schedules for the use of parents and teachers had shown what methods were likely to be most dependable in gathering such data. As for conclusions having a statistical basis, none could be established except on a far larger number of cases. This is especially true of comparisons involving age, race, school grade, occupational class, etc. It was clear that for such purposes it would be necessary to locate 500 or 1,000 cases by a method which would insure that the group selected would be reasonably representative of intellectually gifted children.

The Present Study

The task of locating the desired number of cases and of securing the necessary tests and supplementary data was of course far too costly to be financed out of the ordinary budget of a university department. Fortunately, early in 1921 the directors of the Commonwealth Fund made a grant of $20,300 to Stanford University to continue and extend the research. The purposes of the grant as indicated in the formal application which the author submitted under date of February 23, 1921, were as follows: (1) to increase the number of gifted subjects to approximately 1,000; (2) to secure at least two intelligence tests of each subject; (3) to secure measures of school achievement in at least four or five of

[1]Lewis M. Terman and Jessie C. Fenton: Preliminary Report on a Gifted Juvenile Author. *Journal of Applied Psychology*, 1921, Vol. 5, pp. 163–178.

[2]Lewis M. Terman and Jessie M. Chase: The Psychology, Biology, and Pedagogy of Genius. *Psychological Bulletin*, Vol. 17, No. 12, Dec., 1920. pp. 397–409.

the school subjects; (4) in the case of a small number of cases to give tests of specialized ability; (5) revision of the methods of securing trait ratings and social data; and (6) follow-up of the subjects for a period of at least ten years.[1] In 1922, before the end of the first year's work, an additional grant of $14,000 was received from the Commonwealth Fund for the purpose of extending the study along medical, anthropometric, and psychological lines. This sum was supplemented by a contribution of $8,000 in money and $6,000 in services from Stanford University. The money cost of the study here reported, apart from services contributed, was therefore $42,300. The contribution of services by the University has exceeded the amount stipulated and would bring the total cost of the study to more than $50,000.

The second Commonwealth grant made it possible to secure for our main group of subjects anthropometric measurements, medical examinations, character and personality tests, and interest tests; and, in addition, to carry out a parallel biographical study of the early mental traits of three hundred men and women of genius.

The first grant was made available in May, 1921. May, June, and July were devoted by the writer to the preparation of plans, tests, and information blanks and to securing the necessary help. The research staff to begin with was as follows:

Assistant Director:
Dr. T. L. Kelley, Stanford University.[2]

Field Assistants:
Florence Fuller, M.A., University of Minnesota.
Florence Goodenough, M.A., Columbia University.
Helen Marshall, M.A., Ohio State University.
Dorothy H. Yates, Ph.D., University of California.

Office Assistant:
G. M. Ruch, Ph.D., Stanford University.

[1]It was stipulated that the follow-up work should be financed by Stanford University.

[2]Before the investigation had proceeded far Dr. Kelley left for Europe, but after his return, nine months later, he gave invaluable assistance in connection with the treatment of data. His relation to the entire investigation may best be characterized as that of statistical consultant, although he should not be held responsible for the statistical shortcomings of the report.

It will be evident that the success of an undertaking of the kind here described depends in no small measure upon the qualifications of the field assistants secured. In the search for suitable assistants the leading universities of the country were canvassed by the writer in person. Every selection made proved to be a happy one. Dr. Yates had recently completed a Ph.D. dissertation on gifted high school pupils; Miss Goodenough had worked extensively in mental tests and clinical methods with Dr. Leta S. Hollingsworth; Miss Marshall had worked with Dr. Rudolf Pintner in mental surveys of school children; and Miss Fuller had assisted Dr. M. E. Haggerty for a year in a survey of gifted children in Minneapolis. All had had extensive training in the use of tests, all had taught in public schools, and all were especially interested in the proposed investigation. The assistance of Dr. Ruch in the work carried on at the University was extremely valuable. During 1921–1922 this had to do largely with the preparation of tests, especially the achievement and general information tests.

On August 8th the four field assistants began a course of five weeks of intensive training at Stanford University in preparation for their year's work. Professor L. L. Burlingame of the Department of Biology, Stanford University, gave instruction on heredity; Dr. J. Harold Williams, Director of the California Bureau of Juvenile Research, on methods of collecting field data; Dr. Maud Merrill, instructor in psychology, Stanford University, on Binet test procedure; the writer, on the literature of genius. Dr. Ruch assisted in shaping the plans, and in the preparation of information schedules and a general information test.

The data to be collected for each child chosen for study included the following:

1. Two intelligence tests (Stanford-Binet and National B)
2. A two-hour educational test (The Stanford Achievement Test)
3. A fifty-minute test of general information in science, history, literature, and the arts
4. A fifty-minute test of knowledge of and interest in plays, games, and amusements
5. A four-page interest blank to be filled out by the children

6. A two-months reading record to be kept by the children

7. A sixteen-page Home Information Blank, to be filled out by the parents, including ratings on twenty-five traits

8. An eight-page School Information Blank to be filled out by the teachers, including ratings on the same twenty-five traits as were rated by the parents

9. When possible, ratings of the home on the Whittier Scale for home grading.

Field work began early in September, 1921. Miss Goodenough and Miss Fuller were assigned to Los Angeles, Miss Marshall to San Francisco, and Dr. Yates to Oakland and Berkeley. It was thought that the four assistants could canvas grades 1 to 8 in the cities just named and probably also in some of the smaller cities. However, the task proved more tedious than had been foreseen. After a conference with the field assistants late in November, grades 1 and 2 were eliminated from the formal survey in order that grades 3 to 8 might be more thoroughly covered. February 1, 1922, Miss Bessie Fuller was added to the Los Angeles staff. During April, May, and June Miss Marshall was assisted in San Francisco by Miss Elizabeth Kellam, and Dr. Yates in Oakland and Berkeley by Miss Beatrice Lantz. Practically the entire cities of Los Angeles, San Francisco, and Oakland were canvassed in this way, the larger part of Berkeley, and part of Alameda.

With the help of volunteer assistants the following cities were covered more or less thoroughly by the same method as that used in the larger cities: Santa Barbara (grades 2 to 6), by Dr. James L. Stockton, of the Santa Barbara State Teachers' College; Fresno, by Miss Blanche Cummings, Director of Research in the Fresno public schools; San Jose, by Professor J. C. DeVoss, San Jose State Teachers' College; Santa Ana, by Miss Bess Henry, Director of Research in the Santa Ana public schools. With the help of local assistants Pasadena, Redlands, Santa Rosa, Palo Alto, Burlingame, Kelseyville, Irwin, Sebastopol, Burbank, San Mateo, San Bernardino, and a few other cities were canvassed somewhat less thoroughly by a simpler method, to be described later. In the same way the rural schools of San Bernardino County were also covered.

Through the coöperation of the high school principals of the state a modified form of survey was carried out in 95 high schools, enrolling approximately 70,000 pupils. The regular field assistants canvassed most of the high school pupils in Los Angeles, San Francisco, and Oakland. To the many volunteer helpers who contributed so much to the success of the study as a whole, the writer wishes to express his very great obligation.

The procedure of the regular field assistants was as follows: (1) an entire school was canvassed by methods to be described in Chapter II; (2) Home Information Blanks were distributed at once to the parents of the children selected for study, and (in about 95 per cent of the cases) the homes of the children were visited and rated and parents were interviewed; (3) School Information Blanks were distributed to the teachers of the children selected; (4) shortly before the close of the school year, in May and June, 1922, the selected cases of a particular city were called together in groups of 10 to 50 for the achievement tests, the test on plays, games, and amusements, and for the collection of data called for in the Interest Blank. At the same time record booklets were distributed, in which the children were asked to record their reading for a period of two months.

The data thus collected, together with similar data for a control group of about 600 on the plays, games, and amusement test, the Interest Blank, the School of Information Blank, the Information Test, and the reading records, were scored and tabulated in the summer of 1922. In this work the writer was assisted by Miss Fuller, Miss Marshall, Miss Goodenough, and Dr. Yates, as well as by a corps of several clerical assistants. During November and December, 1922, a detailed report was made to the parents or guardian of each child of the gifted group, including definite information on grade of intellectual superiority, standing in each of the achievement tests in terms of "subject ages," information age, special abilities or weaknesses noted, comparison of the child's play interests with those of normal children of the same age and sex, appraisal of the child's reading, and general advice and comment on various points. A reduced copy of this blank follows.

THE STANFORD UNIVERSITY GIFTED CHILDREN RESEARCH

REPORT TO PARENTS: DATE.....

NAME OF CHILD.....DATE OF BIRTH.....

AGE WHEN TESTED.....GRADE WHEN TESTED.....DATE OF TEST.....

PARENT OR GUARDIAN.....ADDRESS.....

(Parent should promptly notify Professor L. M. Terman, Stanford University, of any change of address.)

I. GENERAL INTELLIGENCE. The child's grade of superiority is indicated by a cross.

[] Grd. 1: Most rare.....(Abt. 5 or 10 children in 100,000 eql. or exceed this rank.)
[] Grd. 2: Highly gifted A..(Abt. 30 children in 100,000 eql. or exceed this rank.)
[] Grd. 3: Highly gifted B..(Abt. 90 children in 100,000 eql. or exceed this rank.)
[] Grd. 4: Very superior A..(Abt. 250 children in 100,000 eql. or exceed this rank.)
[] Grd. 5: Very superior B..(Abt. 500 children in 100,000 eql. or exceed this rank.)
[] Grd. 6: Superior A.....(Abt. 1,500 children in 100,000 eql. or exceed this rank.)
[] Grd. 7: Superior B.....(Abt. 7,500 children in 100,000 eql. or exceed this rank.)
[] Grd. 8: High average.....(Abt. 25,000 children in 100,000 eql. or exceed this rank.)

Note. This rating has been given on the basis of standardized intelligence tests. It should be borne in mind, however, that intelligence tests are not infallible; also, that success in school and in life is not determined entirely by one's intelligence. For these reasons the above rating is not to be taken as a sure indication of what the child will later accomplish. It does suggest roughly what may be expected in case the child makes the most of his ability.

Remarks .....

II. SCHOOL ACHIEVEMENT. The child's achievement in the various school subjects corresponds to the grades indicated below.

Reading: corresponds to grade.....Nature and science: corresponds to grade.....
Arithmetic: corresponds to grade.....History and civics: corresponds to grade.....
Language: corresponds to grade.....Literary knowledge: corresponds to grade.....
Spelling: corresponds to grade.....All-round information: corresponds to grade.....

Note. When school achievement is two or three grades above that in which the child is located, an extra promotion is usually desirable, unless the child is already advanced in school very considerably beyond his years. When this is the case, or when achievement is only a little above the grade in which the child is located, it is often better to find extra work for the child to do than to give additional promotions. This extra work may take the form of outside reading or supervised study along any of the child's special lines of interest. Teachers are usually glad to coöperate in planning extra study, as it helps to keep the child busy and therefore more contented and interested in school work. Probably few children, however bright, should enter high school before the age of 11 or 12, or college before the age of 15 or 16. Advancement much more rapid than this involves the risk of defective social development.

Remarks .....

III. SPECIAL INTERESTS AND ABILITIES. (See next line for rating on evenness of interest and ability.)

1. Markedly even, fairly even, somewhat uneven, markedly uneven, very uneven or special.
2. Special interest or abilities noted, if any.....
3. Special weaknesses noted, if any.....
4. School subject preference.....
5. Occupational preference .....
6. *Remarks* .....

IV. Plays, Games and Amusements.

1. Knowledge of, in comparison with that of average children of the same age: much greater, greater, equal to average, less, much less.
2. The child's play interests appear to resemble those of children who are much older, somewhat older, same age, somewhat younger, much younger.
3. The child's knowledge of plays, and the play preferences expressed, are in general markedly masculine, noticeably masculine, neutral, noticeably feminine, markedly feminine.
4. The plays and games for which child has expressed preference indicate
   (a) That the play interests are noticeably non-social, socially normal, more than ordinarily social.
   (b) That the plays preferred are rather quiet or sedentary, ordinarily active, more active than average.

5. *Remarks* .....

V. Reading.

1. Amount of reading, in comparison with that of average children of the same age: very much greater, much greater, somewhat greater, equal to average, somewhat less, much less.
2. Quality of books preferred: very superior, superior, average, rather inferior, very inferior.

Note. If a bright child does not read much more than an average chid, this does not necessarily mean that he ought to be urged to increase his reading. Some children show a natural preference for reading at a very early age; others prefer to spend their time on mechanical devices or in outdoor play. A taste for good reading should always be encouraged, but it is seldom advisable to urge the bright child to read when he strongly prefers to do other things. Most bright children read more than the average, and this is not objectionable if reasonably good books are selected and if it is not carried to such an excess as to rob the child of needed social contacts.

Remarks .....

VI. Additional Comments .....

.....

.....

.....

.....

.....

VII. Continuation of the Study. We are glad to report that the original grant of money to Stanford University from the Commonwealth Fund for conducting this investigation has been increased so as to make it possible to secure a thorough, standardized medical examination of each child in our special group, also additional mental tests for more accurate diagnosis of special interests and abilities. We desire to carry out this extension of our work between December, 1922, and July, 1923, and are hoping that parents will continue to give us the same splendid coöperation which has contributed so much to the success of our study thus far. It is hoped that this continuation of the study will help to bring us into closer personal touch with parents and children. Please do not forget to notify us of any change of address.

VIII. Publicity. We have made and will continue to make every effort to avoid newspaper publicity concerning the results of this study. Several newspapers have tried to secure information regarding some of our subjects, but we have always refused to give it. Two or three unauthorized news items have been published, based mostly on the imagination of reporters. We sincerely hope that parents will coöperate with us in preventing newspaper exploitation of our subjects. The information we have collected in the research is kept in locked files.

[signed].....

Department of Psychology,
Stanford University, California.

Meanwhile, work under the second Commonwealth appropriation had already begun. This included the following divisions and personnel:

1. Medical examinations, by Dr. Edith Bronson and Dr. Albert H. Moore, in coöperation with an advisory committee composed of Dr. Thomas Addis, Dr. Harold K. Faber, Dr. A. W. Hewlett, and Dr. W. E. Schaller, of the Stanford University Medical School, and Dr. Ernest Gale Martin, Professor of Physiology, Stanford University.
2. Anthropometric measurements (37 in all), under the direction of Dr. Bird T. Baldwin, Director of Child Welfare Research, University of Iowa.
3. Character and personality tests; methods prepared by A. S. Raubenheimer.
4. Interest test; method prepared by Jennie Benson Wyman.
5. Preparation of a guide to children's reading, based on reading records of the gifted and control groups, by Margaret Lima.
6. Study of the specialization of abilities, by James C. DeVoss.
7. A biographical and comparative study of the mental development of a representative group of 300 eminent individuals, by Catharine M. Cox.

The plan of the investigation called for the collection of about 65 pages of test and measurement data and about 35 pages of questionnaire data, a total of approximately 100 pages for each child. Practically all of this material was obtained for more than 90 per cent of the main experimental group of 643 subjects, and about half of it for nearly 600 other gifted subjects. In addition, a large part of the material was also obtained for several hundred unselected children. For the intelligence, achievement, and anthropometric measurements norms were already available, but it was necessary to establish norms for the following: School Information Blank (including various kinds of educational data and teacher's ratings on twenty-five traits); the Interest Blank (filled out by the children); the two-months' reading record; the Information Test; the test of play interest and play knowledge; the Wyman Interest Test; and the tests of character and personality traits. This enormously

increased the labor involved in the investigation but provided comparative data of the greatest value. It was not possible, unfortunately, to secure medical examinations or the data called for on the Home Information Blank for an unselected group.

During the course of the investigation several different control groups were utilized, as it was not feasible to secure from a single group all the material that was desired. One group furnished norms for the School Information Blank, another for the Information Test, another for the interest, character, and personality tests, another for the reading record, and another for the Interest Blank and test of play interest and play knowledge. Each of these groups numbered from 600 to 800 children.

After the results of the second year's work had been summarized, another report was issued to parents of the gifted group. The form used in this report follows. A third report, that summarizing the most important data from the physical measurements, is reproduced in Chapter VII.

THE STANFORD UNIVERSITY GIFTED CHILDREN RESEARCH

REPORT TO PARENTS ON INTEREST AND PERSONALITY TESTS

Date of this report.....

Name of child.....Date of birth.....

Parent or guardian.....Date of test.....

Address .....

(PLEASE NOTIFY PROFESSOR TERMAN PROMPTLY OF ANY CHANGE OF ADDRESS.)

Note. These tests have only recently been standardized, and sufficient time has not yet elapsed to permit a thorough checking with other findings. In view of this fact, the results herein reported must be considered somewhat less authoritative than the results of intelligence tests or of tests of school achievement. However, they have been found to have a fair degree of dependability in the majority of cases.

In each test the child's rating has been compared with that of a group of unselected children of the same age and sex. In case of an unfavorable report on any characteristic, the parent should observe the child carefully. If the report seems to be justified, it may be advisable to undertake special training for the purpose of bringing about improvement.

I. CHILD'S TENDENCY TO UNDERESTIMATE OR OVERESTIMATE HIS OWN KNOWLEDGE AND ACHIEVEMENT. (Rating is based upon a comparison between the child's statements as to his knowledge of certain facts, books which he has read, etc., and his score on lists of questions which have been so devised as to show his *actual* knowledge about these same facts.)

The child's ratings on this test indicate that:

He shows a marked tendency to overstate;

Overstates, but not more than does the average child of his age and sex;

Estimates his knowledge accurately;

Has a tendency to underestimate his own knowledge.

II. Social Attitudes. (Based upon child's preference as indicated by his choice of books from a list of descriptive titles, his choice of companions from a list of described characters, and his expressed attitude toward various social organizations.)

The ratings on these tests indicate a social attitude which is in general very desirable; similar to average for age and sex, less desirable than average.

Remarks: .....

.....

.....

III. Reliability of performance in the face of temptation not to follow the rules laid down:

More than average, equal to average, less than average.

Remarks: .....

IV. Emotional Stability. (Based on answers to 85 questions designed to bring out eccentricities of emotional attitude.)

As compared with average children of the same age and sex, the child seems to be: well balanced, of average stability, of less than average stability.

Remarks: .....

.....

V. Interests. (Based on a word association test.)

Note. Children as well as adults differ greatly in the general type of their interests. Some are predominantly active, preferring always the role of the doer to that of the onlooker, others show especially strong social interests, still others are interested primarily in intellectual matters. There are some whose interests are not especially strong in any of these lines, and others whose interests are strongly developed in all of them. The results of the tests are as given below.

1. Intellectual Interests. This child's interests are:
Decidedly intellectual
Somewhat more intellectual than average
Equal to average in intellectuality
Somewhat less intellectual than average
Decidedly non-intellectual

Note. This rating has to do with nature of interests only, not with mental ability. A child whose general mental ability is very high may nevertheless show interests which are more pronounced along social or active lines than along intellectual lines.

2. Social Interests. This child's interests are:
Decidedly social
Somewhat more social than average
Equal to average in sociability
Rather non-social
Decidedly non-social

3. Activity Interests. This child's interests are:
Decidedly strong along activity lines
Rather stronger than average
Equal to average in activity
Rather less than average
Decidedly less than average

Remarks: .....

.....

.....

[signed].....

Department of Psychology,
Stanford University, California.

Miss Goodenough served as chief research assistant throughout the second year, assisted in the standardization of the character, personality, and interest tests which had been devised and validated by Mr. Raubenheimer and Mrs. Wyman, directed the application of these tests in the spring of 1923 to the gifted group, and from June, 1923, to September, 1924, assisted in the preparation of the report. In this work she was assisted a part of the time by Miss Helen Marshall and Miss Alta Williams.

The choice of assistants for the second year's work proved to be no less fortunate than for the first year. Both by training and experience Dr. Bronson and Dr. Moore were ideally fitted for the medical examining. Dr. Baldwin had long been engaged in studies of the physical growth of children from birth to maturity. Miss Cox, Mr. DeVoss, Mr. Raubenheimer, Mrs. Wyman, and Miss Lima were advanced graduate students in psychology and education at Stanford University, and, with the exception of Miss Lima, were working on Ph.D. dissertations in connection with this research.

Throughout its course the investigation owes much to the devoted work of the field assistants, who constantly worked over-time, industriously ran down every clue that promised to yield new subjects or useful information, and by their tactful dealings with parents and teachers secured from home and school the coöperation without which the study could not have proceeded. Of the 649 children who qualified for our main group, the parents of only 6 refused coöperation. The total time-cost of the assistance which parents have rendered has been very great. To fill out the schedule of information called for in the Home Blank is alone a task requiring several hours. In addition, approximately four half-days were required to take the child to the educational tests, the personality and interest tests, the medical examination, and the anthropometric measurements. Almost invariably the parents have shown an interest in the outcome of the study apart from any help they might hope to receive from it.

The purpose and methods of the various divisions of the research are set forth in their respective sections of this report and need not be described here. It may be stated, however, that each part of the study was carried out essentially

as planned, and with results which are believed in each case to throw considerable light on the problems under investigation.

This volume deals with only the first stages of an investigation which will be continued, with the same subjects, for many years. The material that has been gathered is far too extensive to be summarized in satisfactory detail in a single volume. A brief clinical description of each case would alone have required a volume as large as the present one. Every section of the data would have warranted more thorough and detailed treatment than it has thus far been possible to give. The data already collected can be made the basis of numerous minor studies, and the follow-up work which will be carried on indefinitely will increase many times the value of the original material. The present purpose is to show in what traits, and to what extent, a representative group of intellectually superior children differs from a group of unselected normal children. The task of the future will be the comparison of promise and performance. In the fulfillment of this task, new light will be thrown upon the prognostic significance of the test scores and of the other records which have been secured. When our cases have thus been *read backward,* so to speak, it will be easier to read other cases forward; to predict and prescribe in the light of long-range knowledge. Another unlimited field for future research is in the genealogical study of the families represented in our gifted group. It is to be hoped that financial support will be found for this and for other studies which it has thus far been impossible to undertake.

But increased knowledge of the origin and of the physical and mental traits of gifted children is not an end itself. When the sources of our intellectual talent have been determined, it is conceivable that means may be found which would increase the supply. When the physical, mental, and character traits of gifted children are better understood it will be possible to set about their education with better hope of success. Educational experiments in this line are already being undertaken in the public schools in ever increasing number, but these need to be supplemented by privately endowed undertakings which permit of greater freedom for experimentation. Surely, in a nation of a hundred million people there should be one or more schools of this kind;

schools which would be unhampered in the selection of such pupils as the experiment called for, which would be free to follow without hindrance the lead of experimental evidence, and financially in position to allow for long-range planning. In the gifted child, Nature has moved far back the usual limits of educability, but the realms thus thrown open to the educator are still *terra incognita*. It is time to move forward, explore, and consolidate.

CHAPTER II

METHOD AND RESULTS OF THE SEARCH FOR SUBJECTS

The Problem

The purpose of the search was to locate subjects of a degree of brightness that would rate them well within the top one per cent of the school population. It was also desired to secure subjects who would be as fairly as possible representative of all gifted children of the degree of brightness set as a standard for selection. It is obvious that conclusions regarding the characteristics of gifted children in general will be valid only to the extent to which the latter requirement has been met. Too often physicians and psychologists, as well as laymen, have based their conclusions regarding the supposed abnormality of intellectual precocity on selected cases.

It was not considered feasible to attempt to locate the 1,000 brightest children in California, desirable as that would have been. Apart from the difficulties involved in equating the intellectual superiority of bright children of different ages, such a plan was entirely impracticable because of the size of the state (158,000 square miles) and the large school population (approximately 500,000 in grades 1 to 8). The cost of intelligence test blanks for a half million children would alone have greatly exceeded the funds available for the entire research. The labor of giving and scoring the tests would probably have brought the cost of covering the entire state by this method to many times the amount of money available for the study. The limitation of the survey to the larger cities was therefore a matter of necessity. Traveling expenses were thus reduced to a minimum, as well as the time required for making the necessary arrangements with school officials. Such limitation, however, has undoubtedly affected the findings in various important ways, especially with respect to racial and social origin of the subjects, their scores on the various achievement tests, their grade

advancement, their interests, their reading, and their recreational habits.

The next problem was to secure a group of subjects who would be as representative as possible of all gifted children in the territory covered. A satisfactory solution of this problem would have required the application of a perfect measure of intelligence to all the children. A perfect measure was not available, and even if it had been, the cost of its application would have been too great. It was necessary, however, to find some kind of criterion for the selection of an experimental group. The leading possibilities considered were teachers' ratings, age-grade status, achievement tests, and intelligence tests. All of these criteria have been used from time to time, singly or in combination, by various investigators. One would hardly expect any two of them to yield the same subjects out of a given school population, and it is possible that the subjects selected by any one of the methods would differ appreciably in general characteristics from those selected by any other. The rank order of the above criteria for validity is probably as follows: (1) intelligence tests, (2) achievement tests, (3) age-grade status, (4) teachers' ratings.

The faults of subjective ratings have been sufficiently exposed in numerous investigations to show their great unreliability when used alone. Such ratings are usually based too largely on the child's class work and are almost certain to weigh too lightly the age factor. Age-grade status is perhaps a better criterion, but its value is limited (1) by the variable standards in different cities, or even in different schools of the same city, and (2) by the difficulty of equating various degrees of acceleration for children of the different ages. The first-named objection is the most serious. Moreover, the age-grade status of a given child rests ultimately upon a teacher's rating; that is, upon a judgment as to fitness for promotion. It is also likely to be affected by age of entering school, regularity of attendance, adaptability to school requirements, and various other factors having nothing to do with intelligence. Achievement tests, although they are an objective method, were not seriously considered, as they would have been more costly than intelligence tests and inferior to them as measures of native ability.

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Selection of the Main Group

It was decided to use intelligence tests as the final criterion for inclusion of subjects in the main experimental group. However, since it was not feasible to test the entire school population, even by an abbreviated test, it was necessary to use a preliminary sifting method to determine what children should be tested. The method adopted employed both teachers' ratings and age-grade status. In grades 3 to 8 the procedure involved three steps, as follows:

First step. From each class (composed ordinarily of 30 to 50 pupils) from one to five children (usually four) were selected for a mental test by the plan shown in the following blank (printed here in reduced type).

BLANK FOR THE SELECTION OF GIFTED CHILDREN

Regular Class Teacher

To be filled out and returned to the Principal's office before.....

Name of teacher.....Grade taught.....

School .....City.....

To the regular class teacher: Below, write the names of from one to three pupils whom you regard as the most intelligent in your class or classes. If your class as a whole is distinctly superior to the average, three names may be given. If your class as a whole is distinctly inferior, give one name only. If your class is about average, give two names.

Do not base your judgment of intelligence upon school marks alone. Important qualities to consider are quickness and accuracy of mental grasp, originality, ability to reason clearly about new and difficult problems, breadth and accuracy of information, intellectual curiosity, command of language, common sense, and independence of judgment.

Take age into account. Of two pupils who seem to be about equally exceptional, but who differ one or more years in age, the younger is probably the more intelligent.

Do not underrate the bright child who is shy, or lacks industry, or stands low in deportment.

It is permissible to name *one* child of moderate *general ability*, provided such child is very exceptionally gifted in some *special* line, as in music, drawing, modeling, mechanical ingenuity, science, mathematics, composition, etc.

1. *Most intelligent:* Name.....Age (yrs. and mos.).....Grade.....
   Selected because of all-round intelligence or because of some particular talent? (Underline)
   If because of particular talent, in what line or lines?.....
   Is this child's ability "very extraordinary," "decidedly superior," or only "slightly superior"?

.....

2. *Next most intelligent:* Name.....Age (yrs. and mos.).....Grade.....
   Selected because of all-round intelligence or because of special talent? (Underline)
   If because of some special talent, in what line or lines?.....
   Is No. 2 almost as exceptional as No. 1, or considerably less exceptional? Underline)

3. *Third most intelligent:* Name.....Age (yrs. and mos.).....Grade.....
(Third name to be given only in exceptionally superior classes.)
Selected because of all-round intelligence or because of special talent? (Underline)
If because of some special talent, in what line or lines?.....
Is No. 3 almost as exceptional as No. 2, or considerably less exceptional? (Underline)

4. Below name the YOUNGEST pupil in each grade or half-grade represented in your room:
Grade or half-grade..... Youngest pupil..... Age (yrs. and mos.).....
Grade or half-grade..... Youngest pupil..... Age (yrs. and mos.).....
Grade or half-grade..... Youngest pupil..... Age (yrs. and mos.).....
Grade or half-grade..... Youngest pupil..... Age (yrs. and mos.).....

5. In case you taught in this building during the half-year preceding this, give the name of the brightest child in your class THEN.....What grade is that child in now?.....

On the above blank each regular classroom teacher made her nominations. In general, about 6 or 8 per cent of the pupils in grades 3 to 8 were tested, but the proportion varied from school to school. In a few of the best schools as high as 20 per cent of the pupils enrolled were tested; in the poorest schools, as low as 2 per cent.

Second step. Next, the nominees from several classrooms, often those from an entire school building, were assembled in a group and given the National Intelligence Test, Scale B, Form I. Those who ranked in the top 5 per cent of unselected children of their respective ages were retained for further study. This standard proved to be too high, and was later lowered to the ninetieth percentile, i. e., top 10 per cent, in the case of children who, judged by teachers' ratings or age-grade status, seemed to be promising cases. Occasionally the standard was lowered to the eighty-fifth or even eightieth percentile, especially in the case of children of ages 7 and 8. A 7 year old was found, of Binet IQ above 140, who rated only at the eighty-fifth percentile on National B. By our failure to give a Binet test to all above the eightieth percentile on the National, a few cases were undoubtedly lost who would have earned an IQ of 140.

The National age norms used in making this segregation were those found by the writer for the Vallejo, California, public school children.[1] These were practically the only norms available which were based upon tests of an

[1]See *Journal of Educational Research*, 1921, pp. 124–132.

entire school population of ages eight to fifteen inclusive, and were used in preference to the age norms published in the National Intelligence Test Manual. The norms used were as follows:

	Percentile Scores by Age							
	8	9	10	11	12	13	14	15
5% equal or exceed	85	100	114	129	142	154	161	165
10% " " "	72	93	104	123	137	149	157	159
15% " " "	63	87	100	118	132	144	153	156
20% " " "	57	83	97	114	126	138	150	153
25% " " "	51	78	93	109	122	134	147	150

Third step. Pupils retained by Step 2 were next given an abbreviated Stanford-Binet test. Two abbreviations were used, one for children of foreign parentage, the other for children of non-foreign parents. They were as follows:

Foreign	*Non-Foreign*
YEAR IV	
1. Compares lines.	1. Compares lines.
2. Discriminates forms.	3. Counts 4 pennies.
3. Counts 4 pennies.	5. Comprehension.
4. Copies square.	
YEAR V	
1. Comparison of weights.	1. Compares weights.
2. Colors.	2. Colors.
3. Aesthetic comparison.	4. Definitions.
5. Patience.	
YEAR VI	
1. Right and left.	1. Right and left.
2. Mutilated pictures.	2. Mutilated pictures.
3. Counts 13 pennies.	4. Comprehension.
5. Coins.	
YEAR VII	
1. Fingers.	1. Fingers.
2. Picture description.	4. Bow knot.
4. Bow knot.	6. Diamond.
6. Diamond.	
YEAR VIII	
1. Ball and field.	2. Counts 20 to 1.
2. Counts 20 to 1.	3. Comprehension.
3. Comprehension.	6. Vocabulary.
4. Similarities.	

Year IX	
1. Date.	3. Change.
2. Weights.	5. Three words.
3. Change.	Alt. No. 1. Naming months.
4. Four digits reversed.	
Year X	
2. Absurdities.	1. Vocabulary.
3. Designs.	3. Designs.
5. Comprehension.	5. Comprehension.
6. Sixty words.	
Year XII	
3. Ball and field.	1. Vocabulary.
6. Five digits reversed.	4. Dissected sentence.
7. Picture interpretation.	5. Fables.
8. Similarities.	7. Picture interpretation.
Year XIV	
2. Induction.	1. Vocabulary.
3. President and king.	2. Problems of fact.
5. Arithmetical reasoning.	5. Arithmetical reasoning.
6. Clock.	6. Clock.
Year XVI	
2. Fables.	1. Vocabulary.
4. Boxes.	2. Fables.
5. Six digits reversed.	5. Six digits reversed.
6. Code.	6. Code.
Year XVIII	
2. Paper cutting.	1. Vocabulary.
3. Eight digits, direct order.	4. Passages.
5. Seven digits reversed.	5. Seven digits reversed.
6. Ingenuity.	6. Ingenuity.

The selection of tests for the abbreviated Stanford-Binet was made with considerable care and took account of diagnostic value, variety, brevity, and ease of administration. Judgment regarding diagnostic value was based chiefly on correlations of each test with mental age on the complete scale. Such correlations, in terms of per cent of pupils of each mental age passing each test, were available in two Stanford studies.[1] The use of this method is justifiable in

[1](a) For school children, Terman et al: *The Stanford Revision and Extension of the Binet-Simon Scale for Measuring Intelligence*, Warwick and York, p. 164 ff.

(b) For 400 adults, in an unpublished master's thesis by H. E. Knollin, Stanford University.

view of the fact that the aim is to get an abbreviation which will yield approximately the same results as the entire scale.

Non-dependence upon language was, of course, the most important consideration in the abbreviation for children of foreign parentage. In the other abbreviation, also, care was taken to avoid the too exclusive use of verbal or "schoolish" tests. It was thought that the method of nomination would probably over-weight the language factor, and that the intelligence tests ought to err in the opposite direction, if at all. For this reason, in Step 2, National Scale B was used almost exclusively, in preference to Scale A, the latter being more verbal. It is probable that the large use made of non-verbal tests gave a group slightly different from that which would have resulted from the use of tests depending more upon the language factor, perhaps on the whole group slightly less gifted intellectually. On the other hand, the method gave the much-desired assurance that the experimental group would not be characterized primarily by special ability in language.[1]

If the vocabulary test seems over-weighted in the abbreviations used, it is only necessary to point to the correlation of .85 to .95 which have been found between vocabulary score and mental age on the entire scale.[2] The amount of this correlation was deemed to justify rejection of some candidates on vocabulary test alone. This was frequently done in the case of non-foreign children of seven years or older, though never with children below seven. Usually, the vocabulary test was given first, and in case time was limited the examiners were permitted to reject without further test those having a vocabulary quotient of less than 125. After some experience with this rule the standard usually followed was a vocabulary quotient of 120. Examination of the table on page 308 of Terman's *The Intelligence of School Children* will show that the 120 rule is reasonably safe. The following age norms were used in computing vocabulary quotients:

Mental Age	7	8	9	10	11	12	13	14	15	16	17	18	19
Median Vocabulary	13	18	23	30	35	41	46	51	57	62	67	73	75

[1]National Scale B consists of the following five tests: arithmetical computation; general information; sentence meaning; analogies; comparison of numbers, forms, and words.

[2]Terman, Lewis M.: *The Intelligence of School Children*, p. 308.

Pupils attaining an IQ of 130 or more on the abbreviated scale were given a complete examination. The correlation between the entire scale and the abbreviated scale is about .95 for unselected children of a given age, which means that the 130 rule is fairly safe. However, very few cases were rejected on an abbreviated test whose IQ was as high as 125. Older children were ordinarily not rejected on an abbreviated test if the IQ was as high as 120. It was possible to economize time in giving the abbreviated scale by beginning with vocabulary, going next to memory for digits, then working backward with other tests, beginning with the difficult and proceeding to the easy until enough tests had been missed to disqualify the subject, at which point the examination was ordinarily abandoned.

IQ 140 on the complete scale was set as the provisional lower limit for inclusion in the case of children under eleven years. For older children an allowance had to be made for the fact that the brightest children of eleven years or older are graded too low by the Stanford-Binet. The standards set were as follows:

Below 11 years	IQ 140
11 to 11½ "	" 139
11½ to 12 "	" 138
12 to 12½ "	" 137
12½ to 13 "	" 136
13 to 13½ "	" 134
13½ to 14 "	" 132

Binet tests were not given to pupils above the age of 14. The Terman Group Test was to be used instead, but it turned out that few fourteen year old children of very superior intelligence were found in the grades below the high school.

Such was the method of selection in grades 3 to 8. The method in grades 1 and 2 was at first exactly the same, except for the omission of the National test. During the first two months of the survey all nominees in grades 1 and 2 were given an abbreviated Binet. During this period approximately three-fourths of the time of the field assistants was devoted to the first two grades. Moreover, the results here were on the whole less satisfactory than they were in the upper grades, because the teachers' nominations were more often in error. Accordingly, after December 1, 1921,

grades 1 and 2 were no longer canvassed by the use of nomination blanks. Instead, the field assistant thereafter merely visited each primary teacher and enquired whether she had any pupils of very outstanding ability or exceptionally under age for the grade, and such pupils only were tested.

A good many cases were discovered by other than the usual method. Whenever possible, sibs of cases already located were tested. This netted a considerable number and accounts for the majority of those in the main group who were below school age.[1]

A few pre-school cases were located as a result of casual information. Sheer accident accounted for perhaps a half dozen school cases. Some of these accidents were rather surprising. In one case the teacher in nominating the youngest child in her room reported by accident the child whose name was adjacent to that of the youngest child on the roll. This proved to be the only child in the 300 pupils of that building who tested as high as 140 IQ! Another child who met the standard was brought to the test by a child messenger. It was afterward learned that the messenger had by some mistake brought another child than the one the teacher had intended to send. Another subject who qualified was the second-youngest in his class and was only sent to the test because the youngest pupil was absent.

Loss of Subjects

Accidental discoveries of the kind mentioned above were frequent enough to suggest that a considerable proportion of gifted pupils were being missed. A test experiment was therefore arranged through the coöperation of Dr. James L. Stockton, of the State Teachers' College, Santa Barbara. Dr. Stockton had 33 teachers in grades 2 to 6 of seven schools in the city of Santa Barbara make their nominations in regular manner. He then gave National B, *not only to the pupils nominated, but to the entire school population of those grades.* Those reaching the ninety-fifth percentile on the National were all to be given a Stanford-Binet as in our main study. In about half the cases, however, this was not

[1]Additional sibs to the number of 48 were tested during 1922–23, at the time the character and personality tests were given, and of this number, 19 qualified. These have not been added to the 643 cases of the main group in the statistical treatment of most of the data in this report.

possible. The results showed that of the eight pupils qualifying on the data collected, three had not been named on the nomination blanks. Of the five who qualified, four were first choices (one of whom was also youngest), and one was second choice and also youngest. There were five others, not given a Binet test, who would almost certainly have qualified had the data been complete, as all of them reached the ninety-fifth percentile score on National B. One of these had been nominated as brightest and youngest, one as second brightest, one as second brightest and youngest, and two as youngest only. Assuming, conservatively, that only four of these five most promising incomplete cases would have qualified, the total number would have been twelve cases, of whom three, or 25 per cent, would have been missed by the method of search that gave us our 643 regular cases.

If the Santa Barbara data could be taken as typical it might be inferred that our main survey resulted in the location of only about 75 per cent of the subjects who could have met the standards set if all had been tested. The field assistants estimate, however, that the efficiency was nearer 90 per cent. As an additional check, one school of 350 pupils in Los Angeles, and another in San Francisco of 800 pupils, were re-sifted. These two schools were among the very best in their respective cities. In the first sifting the Los Angeles school had netted 12 cases (1 for every 25 enrolled), and the San Francisco school 28 cases (1 for every 28 enrolled). In each school several teachers, after the first sifting, protested that there were other children in the school who were bright enough to qualify. Accordingly, the teachers were all given a second set of nomination blanks and requested to nominate the youngest, the brightest, and the second brightest *of those who had not been nominated in the first sifting.* Tests were then made in the usual manner. In the Los Angeles school not a single new case qualified, but in the San Francisco school ten reached the standard. Of the total 50 cases thus located in these schools, 20 per cent would have been missed but for the second survey. It is entirely improbable, however, that the general loss was anything like as great, for the chances of loss would be lower in schools attended by average or inferior population.

After a little experience the field assistants adapted the method of search somewhat according to the type of school in which they were working, and as a result were both able to save time and to make the search more effective. In the best schools more pupils were tested than the scheme called for, while in the poorest schools it was not necessary to test so many. In the good schools much testing was done in grades 1 and 2, but if a large school had netted no cases in grades 3 to 8 it was deemed safe to omit grades 1 and 2.

It is believed that a considerable loss was incurred by our inability to include private schools in the survey. Judging from the number and character of the private schools in the three centers, this loss was probably greatest in Los Angeles, where such schools are numerous and patronized by the superior social classes, and least in San Francisco, where they are chiefly parochial.

School Population Canvassed

The main search in the cities of Los Angeles, San Francisco, and the East Bay cities of Oakland, Berkeley, and Alameda, yielded 643 subjects, not including 6 whose parents refused to coöperate. These 643 cases were distributed as follows: Los Angeles, 285; San Francisco, 176; East Bay, 182 (81 of these from Berkeley and Alameda, 101 from Oakland). The proportion of cases found to school population canvassed in each section was roughly as follows: Los Angeles, 1 to 330; San Francisco, 1 to 235; Oakland, 1 to 225; Berkeley and Alameda, 1 to 100.

Figures in Table 1 show approximate numbers actually covered in the main survey; they do not include schools or classes not canvassed. Only about one-half the population of grades 1 and 2 was covered. Probably 8,000 of the 12,000 school population of Berkeley and Alameda (grades 1 to 8) were also canvassed. Since 649 regular cases qualified from about 168,000 covered in the main survey, the proportion is about 1 for each 258. If 20 per cent of the cases who could have qualified were missed, the number qualifying should have been about 812, which would have given a proportion of 1 for each 200, or about one-half of one per cent.

Accurate figures are not available for the school population covered in other ways than by the main survey; that

TABLE 1.

SCHOOL POPULATION CANVASSED

Grades	Los Angeles	San Francisco	Oakland	Total
1	11,582	3,470	1,922	16,974
2	7,744	3,011	1,705	12,460
3	14,878	6,278	3,541	24,697
4	12,808	6,247	3,453	22,508
5	12,118	5,592	3,131	21,241
6	11,206	5,645	3,052	19,903
7	10,600	5,518	3,088	19,206
8	14,377	5,053	2,922	22,352
9		471		471
Total	95,313	41,685	22,814	159,812
Total enrollment in grades 1 to 8 in the schools canvassed (1921–1922)	104,330	43,100	26,844	174,274

is, in the high schools throughout the State and in various city schools covered by volunteer assistants. Probably 100,000 is a conservative estimate, which, added to the 168,000 covered in the main search, would give a total school population of more than a quarter of a million.

ANALYSIS OF THE SOURCES OF INFORMATION WHICH YIELDED THE MAIN EXPERIMENTAL GROUP

Interesting facts were brought out by a comparison of the number of subjects in the main experimental group who were located as a result of various kinds of information, including nomination blanks, sib relationship to a child already located, previous tests, special recommendation, etc.; also, in the case of those discovered by the use of the nomination blank, the relative proportions recommended as "most intelligent" in the class, "next most intelligent," "third most intelligent," "youngest," "brightest in preceding class," etc. The following data are for 644 cases of the 649 located in the main survey.

Means of Discovery	N	Per cent of main group
1. By the use of nomination blanks	447	69.4%
2. High record in an earlier test	83	12.9%
3. Special recommendation	48	7.5%
4. Sib relationship to child who had already qualified	41	6.4%
5. By accident or unknown means	15	2.3%
6. By repeated survey of two schools	10	1.5%
	644	100.0%

The fact that about 30 per cent of the entire group were located by other means than through the use of nomination blanks is due partly to the fact that after the first two months the use of such blanks below the third grade was abandoned and that thereafter children in grades 1 and 2 were only tested as a result of special recommendation. A good many other cases were discovered because of sib relationship to a child who had qualified.

The following data show the relative number who received various kinds of nominations. In this case the per cents are based upon the 447 children who were recommended in nomination blanks, and in each case give the *per cent of this group who received a particular kind of recommendation and no other.* It does not include those who were nominated in two ways, e.g., as "most intelligent" and also as "youngest."

Kind of Nomination	N	Per cent of those nominated
1. "Most intelligent" in class	70	15.7%
2. "Next most intelligent" in class	42	9.4%
3. "Third most intelligent" in class	18	4.0%
4. Youngest in class	88	19.7%
5. From teacher of previous half-year	17	3.8%

The remainder of the group are accounted for as follows:

	N	Per cent
Two kinds of nomination	157	35.1%
Three kinds of nomination	55	12.3%

The above figures show that of those discovered as a result of a single kind of nomination, the largest number belong to the "youngest" group and the next largest number to the "most intelligent" group. However, more than

a third of all who were nominated received nominations of two kinds.

An analysis has also been made of each major group, as shown below.

Group nominated as brightest:	N	Per cent of nominated group
1. Total nominated as brightest	230	51.5%
2. Nominated as brightest, no other nomination	70	15.7%
3. Nominated as brightest, also as youngest	105	23.5%
4. Brightest, also nominated by previous teacher	103	23.0%
5. Brightest, also one other kind of nomination	112	25.1%
6. Brightest, also two other kinds of nomination	48	10.7%
Group nominated as second brightest:		
1. Total nominated as second brightest	83	18.6%
2. Second brightest, no other nomination	42	9.4%
3. Second brightest, also youngest	29	6.5%
4. Second brightest, also nominated by previous teacher	19	5.3%
5. Second brightest, and one other nomination	34	7.6%
6. Second brightest, and two other nominations	7	1.6%
Group nominated as third brightest:		
1. Total nominated as third brightest	22	4.9%
2. Third brightest, no other nomination	18	4.0%
3. Third brightest, also youngest	3	0.7%
4. Third brightest, also nominated by previous teacher	1	0.2%
5. Third brightest, and one other nomination	34	7.6%
6. Third brightest, and two other nominations	0	0.0%
Group nominated as youngest:		
1. Total nominated as youngest	232	51.9%
2. Youngest, no other nomination	88	19.7%
3. Youngest, and one other nomination	89	19.9%
4. Youngest, and two other nominations	55	12.3%
Group nominated by previous teacher:		
1. Total nominated by previous teacher	147	32.9%
2. Nominated in this way and no other	17	3.8%
3. This, and one other nomination	75	16.8%
4. This, and two other nominations	55	12.3%

Perhaps the most important single finding is that nomination as youngest yielded more subjects who would otherwise have been missed than any other kind of nomination, 19.7 per cent of the total nominated group. Nomination as

brightest yielded 15.7 per cent who were nominated in no other way. *In other words, if one would identify the brightest child in a class of 30 to 50 pupils it is better to consult the birth records in the class register than to ask the teacher's opinion.* This finding has a very high reliability, as it is based on the nominations made by approximately 6,000 teachers.

The fact that nomination as second brightest yielded 42 subjects (9.4 per cent of entire nominated group) who would not otherwise have been discovered, and that nomination as third brightest yielded 18 subjects, or 4.0 per cent of entire nominated group who qualified, strongly suggests that a similar number may have been missed by failure to call for second youngest and third youngest. If so, our group of 643 should have been larger by about 60, in which case the total would have been a little over 700. This would mean a loss of about 8.6 per cent. It is probable that the loss from this failure was between 7 and 10 per cent of the total number of availables.

However, to have included the second youngest and third youngest would have necessitated giving a National test to 12 or 15 per cent of all the pupils. Possibly it would have been still better to have given a five-minute opposites test to all the pupils as a means of preliminary sifting. This method was considered and was rejected only for the reason that its use would have given rise to the criticism that the gifted group so obtained would tend to belong to the verbal type.

One may conclude that the method of selection employed, although far from ideal, probably led to the discovery of at least 80 per cent and possibly 90 per cent of all the cases who could have qualified in the school population canvassed. One can only surmise how the undiscovered cases would have differed from our experimental group in sex proportion, mean intelligence, social origin, personal characteristics, etc. They would almost certainly have been found a little less accelerated in school. Some would be excessively shy, others lazy, and still others lacking in adaptability. On the whole, the average child of our group is perhaps slightly better adapted to school life than is the strictly average gifted child of the same degree of brightness. It is improbable, however, that the general character

of our group would have been significantly different from what it was, had it included all the cases that were overlooked.

It has not yet been possible to make an analysis of the nominees who failed to qualify for the gifted group. In all, approximately 20,000 nominations were made in the main search. Many of these were duplicate nominations, but it is probable that the number of different children nominated was in the neighborhood of 10,000. Practically all of these were given some kind of intelligence test, probably 8,000 of them the National. Many of the test blanks were scored only far enough to show that the required standard had not been met. It is hoped that sometime it will be possible to complete the scoring and to compare the relative showing made by various groups of nominees. The results of such a comparison should prove very instructive.

Special Ability Cases

The main search was not calculated to bring to light special ability cases, and a supplementary search was therefore planned for this purpose. It was thought that this procedure would probably net a few cases of very superior general intelligence who had passed with their teachers as having special talent only. It was hoped, however, to locate a number of genuine special ability cases for study and follow-up. Special teachers of art, music, manual training, domestic science, and agriculture filled out the following nomination blank:

BLANK FOR THE SELECTION OF GIFTED CHILDREN

Special Subject Teacher

To be filled out and returned to the Principal's Office before.....

Name of teacher.....School (or Schools).....City.....

To the special subject teacher: The purpose of this blank is to locate children who show exceptionally superior talent in such special lines as music, drawing, painting, modeling, dramatics, mechanical ingenuity, use of tools, etc. Below, write the names of from one to three children who, of all the children enrolled in your special subject classes, show the greatest amount of talent. Name at least one pupil for each special subject you teach. Give one or even two additional names in case you have that many who show very exceptional talent.

Take age into account. Of two pupils who do work of about equal quality, but who differ one or more years in age, the younger is probably the more talented.

Subject taught.....Grade or grades.....Total No. of children

1. *Most talented*.....Age (yrs. and mos.).....Grade.....School.....
Is this child's talent "very extraordinary," "decidedly superior," or only "slightly superior?"

.....

2. *Next most talented*.....Age (yrs. and. mos.).....Grade.....School.....
Is No. 2 almost as exceptional as No. 1, or considerably less exceptional? Underline)

3. *Third most talented*.....Age (yrs. and mos.).....Grade.....School.....
Is No. 3 almost as exceptional as No. 2, or considerably less exceptional? (Underline)

ADDITIONAL SUBJECT TAUGHT.....Grade or grades.....Total No. of children.....

1. *Most talented*.....Age (yrs. and mos.).....Grade.....School.....
Is this child's talent "very extraordinary," "decidedly superior," or only "slightly superior?"

.....

2. *Next most talented*.....Age (yrs. and. mos.).....Grade.....School.....
Is No. 2 almost as exceptional as No. 1, or considerably less exceptional? (Underline)

3. *Third most talented*.....Age (yrs. and mos.).....Grade.....School.....
Is No. 3 almost as exceptional as No. 2, or considerably less exceptional? (Underline)

The above blank was used for about eight weeks, but it netted so few cases showing evidence of real talent that it was abandoned. In general intelligence the special ability subjects averaged 114 IQ. Among the most marked cases of musical ability were three children (all boys) who qualified for the regular gifted group. Ten others, three boys and seven girls, were purely special ability cases. Some of the latter were located as a result of inquiries among private music teachers. These ten cases had an average IQ of 122, with a range from 95 to 139.

The search for special talent in art was especially disappointing in all three centers. In Los Angeles a special art class is maintained for the 50 most promising pupils in the city. These pupils meet twice a week, in two classes of 25 each, to be given instruction by the best art supervisors in the city. The selection of pupils for this privilege involves, first, nomination by regular teacher to art teacher, then recommendation from art teacher to art supervisor, and, finally, recommendation from supervisor to head supervisor. Of the 50 children attending these classes, the 6 boys and 9 girls most promising as judged by the art supervisors, were examined. Not only was the average IQ low (109, range 79

to 133), but with two or three possible exceptions there was little evidence of anything more than "copying" ability. It must be admitted, however, that satisfactory measuring methods were not available. The children themselves, with few exceptions, were looking forward to other careers than art. There is considerable evidence that exceptional talent in painting or drawing is less likely than musical ability to appear precociously. Every city has its musical prodigies who give recitals, but it is said that in the history of New York City there has been but one public exhibition by a child artist. It will be interesting in the follow-up study to note how many of the 643 children in our main experimental group later show well marked specialized talent.

Search in Outside Schools

In the outside schools a nomination blank similar to the one given above was used except that the teacher was asked to nominate only the brightest, second brightest, and youngest in her class. The nominees of grades 1 and 2 were then given a Stanford-Binet test, those of grades 3 to 8 a National Intelligence Test (Scale A or Scale B), and those of grades 9 to 12 a Terman Group Test. The standard for acceptance on the National was as follows:

Age					Score
7	but	not	yet	7½	73
7½	"	"	"	8	82
8	"	"	"	8½	90
8½	"	"	"	9	97
9	"	"	"	9½	104
9½	"	"	"	10	111
10	"	"	"	10½	118
10½	"	"	"	11	125
11	"	"	"	11½	132
11½	"	"	"	12	138
12	"	"	"	12½	144
12½	"	"	"	13	149
13	"	"	"	13½	154
13½	"	"	"	14	159
14	"	"	"	14½	163
14½	"	"	"	15	167

The minimum T. G. T. scores for high school pupils were as follows:

Age	Score
Below 12	135
12 but not yet 12½	145
12½ " " " 13	155
13 " " " 13½	165
13½ " " " 14	174
14 " " " 14½	183
14½ " " " 15	190
15 or above	195

Although the outside surveys netted many interesting subjects whom it will be well worth while to follow up, their immediate results were disappointing because of the impossibility of controlling conditions. The outside cases selected on the basis of a Binet test numbered 356; and on the basis of a Terman Group Test or National Intelligence Test, 378; all outside cases, 734. The results for these are not very suitable for statistical treatment because of certain departures from instructions, and because not all of the subjects qualified on the same kind of test. Also, the supplementary data are far less complete than they are for our main group. Some of the most important data for 309 of the outside cases located in the high school survey are summarized in Chapter XIX.

CHAPTER III

COMPOSITION OF THE GIFTED GROUP[1]

By May 1, 1924, our files included 1,444 subjects, classified as in Table 2.

TABLE 2.

CLASSIFICATION OF THE GIFTED GROUPS

	Boys	Girls	Total
I. Main Experimental Group:			
1. Up to standard and parents coöperating	356	301	657
2. Up to standard but inadequate coöperation from parents	5	7	12
3. Somewhat below standard but included for special reasons	8	5	13
4. Deceased	1	1	2
Total, Group I	370	314	684
II. Outside Binet Group:			
1. Parents coöperating	130	120	250
2. Parents not coöperating	67	39	106
Total, Group II	197	159	356
III. Outside High School Group:			
1. Parents coöperating	201	98	299
2. Parents not coöperating	55	23	78
3. Deceased	1	0	1
Total, Group III	257	121	378
IV. Special Ability Group:			
1. Parents coöperating	8	13	21
2. Parents not coöperating	2	3	5
Total, Group IV	10	16	26
Grand Total	831	613	1444

In addition to the above 1,444, there are 211 outside cases (103 boys and 108 girls) in our files who failed by a small margin to qualify but are being followed up.

[1]Written with the assistance of Florence L. Goodenough.

Group I is by far the most important group, as it is composed almost entirely of subjects who were located in the main survey and for whom we have collected the most extensive data. It consists of 684 subjects. However, what is referred to throughout this volume as the "main experimental group" included only 643 of these subjects. This restriction of numbers is due to the following facts: (1) 33 of the 684 cases were siblings of the original 643 and were either tested for the first time a year after the original survey was made or were later transferred to the main experimental group from other classifications. (2) Two boys with IQ's of 111 and 114, twins of qualified subjects, were included in order to avoid possible jealousy. These cases have not been included in any of the statistical reports. (3) Parental coöperation was refused in 6 cases. These three groups account for 41 cases, which, subtracted from 684, gives the 643 cases of the main experimental group.

Group II includes 128 old cases that had been located between 1911 and 1921, and 228 that were located in 1921-1922 by the help of volunteer assistants in cities of California other than those covered in the main search. It is the outside pre-high school group, and was selected for the most part on the basis of National and Binet tests. The data which have been collected for this group have not been summarized, largely because they are so incomplete.

Group III is the result of a coöperative survey carried on by principals of 95 high schools in California, and was selected chiefly by the use of the Terman Group Test. Chapter XIX has been devoted to a summary of some of the data collected for this group.

The nature of Group IV has been indicated in the preceding chapter.

Composition of Main Experimental Group

Table 3 shows the distribution of the uncorrected IQ's of the main experimental group of 643 subjects by age and sex. It is seen that the largest numbers of cases are found in the age groups 8 to 12, inclusive, and that the mode is at 10. This is due for the most part to the fact that the search was carried out chiefly in grades 3 to 8. Many bright children of 7 years or less have not yet reached the third grade, while

TABLE 3.

DISTRIBUTION OF UNCORRECTED IQ'S OF MAIN GIFTED GROUP

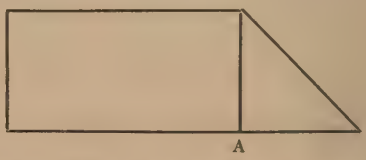
Age	2–4		5		6		7		8		9		10		11		12		13		Total		Total Both Sexes
IQ	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	
200																							
195																							
190						1																1	1
185												1										1	1
180			1						1	1											2	1	3
175		1								1		1		1								4	4
170							2	1	3	2	1		1	1	1						8	4	12
165						2			3	2	3	2	6	1	2						14	7	21
160			1			1	3		3	5	5	1	6	4		3					18	14	32
155		1			3	1	1	1	3	5	6	4	15	4	4	6	2	1			34	23	57
150	2		1	2	3	4	5	1	11	3	16	9	12	10	13	5		1			63	35	98
145	2		5	2	2	1	7	8	9	9	11	9	13	21	15	16	6	6	1		71	72	143
140	2	3	2	3	7	9	7	8	11	12	16	14	22	11	17	15	16	16	6	2	106	93	199
135	2	1	1		1	1	1			2	3	1	2	1	8	4	11	13	5	7	34	30	64
130–134								1									1	1	1	4	2	6	8
Total	8	6	11	7	16	20	26	20	44	42	61	42	77	54	60	49	36	38	13	13	352	291	643

many of the brightest 12 year olds and nearly all of the brightest 13 year olds are in the high school. The decrease in the number qualifying after age 11, and the relative infrequency of very high IQ's among the older subjects who did qualify, is in part due to the inadequacy of the Stanford-Binet for the older gifted, although some allowance was made for this by lowering somewhat the standard for qualification for subjects 12 years old or older.

An attempt has been made to correct the IQ's to correspond to what they would have been had the scale been more nearly adequate in the upper range. Various methods of making this correction were tried empirically until one was found which seemed satisfactory.[1] The correction used

[1]By the first method attempted, the gifted children were divided into groups according to the basal year. For each basal year-group of subjects the average number of months of mental age earned in each year-group of tests above the basal year, was calculated. Curves were plotted and smoothed. The ratio of the mean total increment to the basal year was next calculated. It was found, however, that to take this ratio alone as a basis for correction gave very questionable results in individual cases.

The next method tried was that of plotting individual tests to see whether the amount of scatter tended to preserve a fairly constant ratio for successive years. In general, this was found to be the case. The results of a test in which the child has "worked himself out" may be represented graphically by the following figure in which the point A indicates the basal year.



If the scale is inadequate to show the true mental level, it may be indicated thus:

The point C indicates the limit of the scale; A, the basal year; and B some intermediate year. Accordingly, the ratio of the number of months gained beyond any point after the basal year to the mean of the months scored in the two immediately preceding years was taken as the basis for correction. This was found to give more consistent results than the first method (ratio of total increment to basal year). By applying this ratio and smoothing, the correction table given above was derived.

involved the following additions of months to the mental age score for those passing various numbers of tests out of the total of twelve tests in year groups 16 and 18:

Tests passed in 16 and 18	5	6	7	8	9	10	11	12
Number of months to add	3	6	9	12	15	18	21	24

Applying this correction we have the distribution shown in Table 4.

It is seen that the corrected quotients reduce considerably the age differences with respect to various grades of superiority. The proportion of IQ's as high as 170 at various age levels in Table 4 is as follows:

Age 2 to 5, 2 of 32 cases, or 6.2%
Age 6 and 7, 4 of 82 cases, or 4.8%
Age 8 and 9, 16 of 189 cases, or 8.5%
Age 10 and 11, 19 of 240 cases, or 7.9%
Age 12 and 13, 2 of 100 cases, or 2.0%

Only at age 12 and 13 is the difference very marked, and here the drop may be explained as due largely to the fact that many of the brightest children of these ages have been promoted to the high school. The mean corrected IQ by age is as follows:

2 to 5	6 and 7	8 and 9	10 and 11	12 and 13
148.75	149.45	151.95	153.9	149.1

Accordingly, when we allow for the known inaccuracies of the intelligence scale used, the frequency of high-scoring children shows little tendency to increase or decrease in the total age range covered. For this reason it seems justifiable to throw all the ages together for a total IQ distribution.

It will be noted that 21 cases were included whose corrected IQ's are in the interval 135–139, and one who is in the interval 130–134. The large majority of these 21 cases are within a point or two of IQ 140. Some of them were included because of indications that the Binet score, due to the conditions of the examination, was lower than it should have been; several of them because they were sibs of children who had already qualified; and a few because of special interest which attached to their cases. The number of exceptions made is, of course, too small to affect appreciably the general character of the experimental group or to in-

TABLE 4.

DISTRIBUTION OF CORRECTED IQ'S OF MAIN GIFTED GROUP

Age	2–4		5		6		7		8		9		10		11		12		13		Total		Total Both Sexes
IQ	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	
200												1										1	1
195																							
190						1								1								2	2
185												1			1						1	1	2
180			1						1	1			4	1	2						8	2	10
175		1								3	1		1			2					2	6	8
170							2	1	3	1	2	2	2	3		2	2				11	9	20
165						2			3	2	2		8	1	4	4		1			17	10	27
160			1			1	3		3	4	4	2	7	6	8	2		2			26	17	43
155		1			3	1	1	1	3	5	6	7	7	5	3	9	6	5		1	29	35	64
150	2		1	2	3	4	5	1	11	3	16	6	17	11	17	11	7	10	6	1	85	49	134
145	2		5	2	2	1	7	8	9	9	11	8	10	16	12	11	11	13	7	6	76	74	150
140	2	3	2	3	7	9	7	8	11	12	16	14	19	9	12	6	9	6		5	85	75	160
135	2	1	1		1	1	1			2	3	1	2	1	1	2	1	1			12	9	21
130–134								1														1	1
Total	8	6	11	7	16	20	26	20	44	42	61	42	77	54	60	49	36	38	13	13	352	291	643

TABLE 5.

IQ DISTRIBUTION FOR AGES COMBINED

IQ	Uncorrected			Corrected		
	B	G	Total	B	G	Total
200	0	0	0	0	1	1
195	0	0	0	0	0	0
190	0	1	1	0	2	2
185	0	1	1	1	1	2
180	2	1	3	8	2	10
175	0	4	4	2	6	8
170	8	4	12	11	9	20
165	14	7	21	17	10	27
160	18	14	32	26	17	43
155	34	23	57	29	35	64
150	63	35	98	85	49	134
145	71	72	143	76	74	150
140	106	93	199	85	75	160
135	34	30	64	12	9	21
130–134	2	6	8	0	1	1
Total	352	291	643	352	291	643
Mean	148.635	147.825	148.268	151.418	151.210	151.33
S. D.	8.8605	9.5525	9.189	9.858	10.5665	10.186

validate conclusions which are drawn with respect to the mental and physical traits of children of IQ 140 or higher.

COMPOSITION OF GROUP II

Table 6 gives the IQ distribution of Group II, subjects who were selected by volunteer assistants on the basis of Binet tests given in California cities not covered in the main survey. Of these, 128 are cases which have been under observation for several years and about 75 are from other states than California. Several have been tested more than once. When more than one test score was available the IQ that was entered in Table 6 is that from the test which was most complete. In a few instances where the tests seemed to be of about equal validity, the mean of the IQ's was taken.

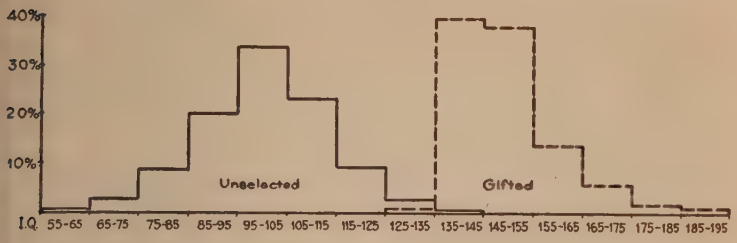
Figure 1 shows the distribution of 999 gifted cases (643 in the main experimental group plus 356 in Group II) in comparison with the IQ's of the 905 unselected children on whom the Stanford-Binet test was standardized. The "uncorrected" IQ's are used in Figure 1.

TABLE 6.

IQ'S OF OUTSIDE BINET GROUP (UNCORRECTED)

Age	2–4		5		6		7		8		9		10		11		12		13		14		Total		Sexes Combined
IQ	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	
195																									
190			1				1																2		2
185					1			1	2	1													3	2	5
180							1			1				1								1	1	3	4
175		1					1		1				1			1							3	2	5
170				1			1	1			1	1	3										5	3	8
165			1			2		1		2	1	3	4		1	1							7	9	16
160	2		1						2	1	3	2	2	1	2	1							12	5	17
155	1	1		1	1		4	3	6	1	4		1		4	1	2						23	7	30
150	1	2	2	3	2	2	2		4	4	6	4	4	5	2	3	2	4	2	1			27	28	55
145	2	2	4	2	2	1	3	1	3	8	5	5	8	5	9	4	7	5	2	3	1		45	37	82
140	3	3	1	1	5	7	5	5	7	9	9	9	12	7	11	5	8	8	4	3			65	57	122
135		2			1	2					1		2	2									4	6	10
130–134																									
Total	9	11	10	8	12	14	18	12	25	27	30	24	37	21	29	16	19	17	8	7	2		197	159	356

FIGURE 1.
IQ DISTRIBUTIONS FOR 999 GIFTED AND 905 UNSELECTED CHILDREN



COMPOSITION OF GROUP III

Table 7 gives by age and sex the Terman Group Test scores of 370 of the 378 subjects in Group III, the outside high school group, who qualified on this test.

COMPOSITION OF GROUP IV

This group is composed of the special ability cases that failed to qualify for any of the other gifted groups. It does not include cases of undoubted special ability that were able to qualify on the basis of the IQ. The group is as follows:

With artistic ability

Sex	Age	IQ	
G	11	133	
G	13	127	
B	13	126	
B	13	126	
G	12	122	
G	13	115	
B	14	114	
B	13	110	
B	17	100	(little English spoken)
B	12	92	
G	10	91	
G	15	(T. G. T. score 89)	
G	14	101	
G	14	87	
G	15	79	

With musical ability

Sex	Age	IQ
B	5	139
G	10	136
G	10	132
B	(not recorded)	131
G	12	125
B	9	121
G	12	120
G	13	115
G	10	110
G	7	95

With mechanical ability

B	8	108

TABLE 7.

TERMAN GROUP TEST SCORES OF OUTSIDE HIGH SCHOOL GROUP

T. G. T.	AGE																			
	11		12		13		14		15		16		17		18		19 or over		Total	
Score	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G
215													2						2	
210							1	1	6	1	2		4	1	1				14	3
205					2		3		7	3	7	5	7	2	2		2		30	10
200				2	3	1	4	5	10	2	10	10	20	6	5	3	3		55	29
195					4	2	10	5	12	4	15	9	14	2	7	1	5	1	67	24
190	1		2		5	2	7	4					1						16	6
185			2	2	9	8	7	1											18	11
180			2		6	3	2	5		1									10	9
175	1		3	2	13	4													17	6
170			1		2	4		1											3	5
165	2		3	1	4	1													9	2
160			3	2															3	2
155		1	5	3															5	4
150		1	1	1															1	2
145	1	2		2															1	4
140		1																		1
135																				
130–134		1																		1
Total	5	6	22	15	48	25	34	22	35	11	34	24	48	11	15	4	10	1	251	119

Sex Ratio

In all of the groups except the special ability group, the boys are considerably more numerous than the girls, notwithstanding the precautions that were taken to avoid sex preference in the methods of search. In the main experimental group there are 352 boys to 291 girls (54.7 per cent boys and 45.3 per cent girls), a ratio of 121.0 to 100. The S.D. of the proportion is 1.96.[1] Of 33 cases later added to the main experimental group, there were 11 boys and 22 girls. If we include these, the ratio becomes 363 boys to 313 girls, or 116.0 to 100. Turning to Group II, the outside Binet group, we find 197 boys and 159 girls, giving a ratio of 123.9 to 100. Group III, the high school group, yields 257 boys and 121 girls, a ratio of 212.3 to 100.

It is well known that there is an excess of male births in the general population. Perhaps the most extensive statistical study has been made by Nichols,[2] who finds a ratio of 105.5 males to 100 females in living births of Europe and 105.9 to 100 in living births of whites in the United States. The excess of males is greater in still-births and less in multiple births. The above ratios correspond closely to those reported for other mammals. In the case of pure Albino rats, for example, Miss King found for 80 litters and 452 offspring a ratio of 107.3 males to 100 females.[3] The reason for this excess of males is not definitely known, but a possible explanation is that sperms which contain the male-producing sex chromosome, being lighter by a minute fraction than other sperms, may travel somewhat faster and attain the upper reaches of the oviduct in larger numbers.[4]

However, the best standard with which to compare the sex ratio in the gifted group is the sex ratio in the pre-high school population of the cities covered by the survey. This was found to be 104.5 boys to 100 girls. Our problem is,

[1]The S.D. of a proportion $= \sqrt{\frac{P \times Q}{N}}$, where P = the per cent of category 1, Q the per cent of category 2, and N = the number of cases.

[2]J. B. Nichols: Numerical Proportions of the Sexes at Birth. *Memoirs of Am. Anthrop. Ass'n.* Vol. 1, 1907, pp. 249–300.

[3]Helen D. King, *The Sex Ratio in Hybrid Rats.* Pub. by the Wistar Institute.

[4]See T. H. Morgan: *Mechanism of Mendelian Heredity.* 1923, pp. 134–140.

therefore, to explain the difference between this ratio and those found for the gifted groups, the latter ranging from $\frac{116}{100}$ to $\frac{212}{100}$. Four hypotheses will be examined.

1. Biased selection. It is possible that the method of selection may have favored the boys, although in view of the fact that nominations on the basis of estimated intelligence were in the vast majority of cases made by women teachers, one would hardly expect this to be the case. The nomination blanks filled out by teachers were examined for evidence of sex preference. Owing to the difficulty of identifying sex of a nominee by the name, some inaccuracy is introduced, and examination was therefore not carried out for the 6,000 or more blanks secured, but only for those filled out by the teachers of children who qualified for the gifted group. It is especially important to know whether these particular teachers showed a large sex preference in their nominations.

Of the original 643 cases (352 boys and 291 girls), 257 boys and 190 girls had been located as a result of nominations. The others were discovered in various ways, as explained elsewhere. The figures 257 and 190 give a ratio of 135.3 boys to 100 girls. The blanks on which these children were nominated contained nominations of 1,010 boys (765 in addition to those qualifying) and 920 girls (738 in addition to those qualifying). The figures 1,010 and 920 are in the ratio of 109.7 boys to 100 girls. Omitting those qualifying, the ratio is 103.7 boys to 100 girls, which is almost exactly the same as the ratio for the entire school population in the cities covered. One could hardly conclude that the excess of boys in our group is due to the bias of teachers in making nominations. Even a large excess of boys nominated would not be proof of bias. The fact that the sex ratio of nominations on these blanks was 109.7 boys to 100 girls, whereas the sex ratio of those qualifying from these same nominations was 135.3 boys to 100 girls, would seem to free the teachers of the suspicion of bias.

There remains the question whether the Stanford-Binet test, which was relied upon for the final selection, is more favorable to boys than to girls. It is not possible here to review the numerous investigations that have been reported

on this point in the literature of mental tests, nor is it necessary. The results have shown fairly consistently that, age for age and grade for grade, girls do fully as well on this test as boys.

Private schools, of which there are a considerable number in the cities canvassed, were not included in the survey. It is, of course, possible that such schools enrolled more gifted girls than gifted boys. We consider this unlikely, but the facts are not available.

2. *Sex ratio in families of gifted.* At the time the material on sex ratio was tabulated, data were available for 502 of the total 578 families which produced the main gifted group of 643 children. These 502 families yielded 317 gifted boys and 274 gifted girls, a ratio of 115.7 to 100. The total number of children in the same families was 655 boys and 548 girls, giving a ratio of 119.5 to 100. The ratio among the sibs of the gifted was 123.35 to 100,[1] which is appreciably higher than for the gifted themselves.[2] It appears, therefore, that the factor which operates to give an excess of boys among the gifted affects no less strongly the sibs of the gifted. It has been suggested that superior vigor or vitality of parents favors maleness of offspring, and that this factor might at the same time exert a favorable influence upon the nervous structure and mental development of the offspring. There is a certain amount of indirect evidence which supports this hypothesis. Riddle[3] found that in the case of pigeons, in which the determiner for sex is carried by the female (it is carried by the male in mammals), if the female is stimulated by removal of eggs from the nest to keep on laying, the eggs later produced result in an excess of female offspring. By analogy, one might infer that in the case of human beings, superior vigor of fathers

[1]Not calculated by simple omission of the gifted themselves. To do this would introduce a statistical error, since it would mean giving least weight to those families producing most gifted children. The method followed was that of counting the siblings of each gifted child regardless of the number of gifted produced by the family. This involves duplications in the case of those families producing more than one gifted child and means weighting the sex ratio in each family in proportion to the number of gifted children produced by it.

[2]The gifted having an IQ of 160 or higher had 86 brothers and sisters, a ratio of 112.6 to 100.

[3]Oscar Riddle: Sex Control in Pigeons. *American Naturalist*, July, 1916. Vol. 50, pp. 385–410.

would result in an excess of male births. It need hardly be said that analogical reasoning in the biological field has no value except in so far as it suggests investigation. It is true, however, that the medical and anthropological data which we have secured indicate that gifted children come from families of more than average vigor. As will be shown in later chapters, the children themselves are well nourished and average above normal in height and weight; infant mortality among the sibs has been very low; and the grandfathers rate considerably above average in longevity.

In a study of longevity, 150 families were selected which seemed to show the greatest tendency to long life. The selection could not readily be made on a purely objective basis, owing to the presence of so many variables, such as age of relatives, number in the family, number of deaths that had occurred, occupation, etc., but there is no doubt that the method used gave on the whole a group of families of superior longevity. Possible bias was ruled out by having the selections made by an assistant who had no knowledge of the use to be made of the data. In the 150 families so selected there were in all 253 children; 136 boys and 117 girls. This gives a ratio of 116.2 to 100, as compared with a ratio of 119.5 to 100 for the children of the entire group of families for which we have data. For the 253 children of long lived families there were 552 uncles and 509 aunts reported, a ratio of 108.2 to 100, which is very close to that found in the general population.

It seems, therefore, that whatever the factor involved, it operates to give an excess of males only among the gifted children and their sibs, not among their relatives. In line with this is the fact that 478 of Cattell's American Men of Science had 716 sons and 668 daughters, a ratio of 107.2 to 100, or almost exactly the same as the ratio for the general population. The facts presented above offer no evidence that the general stock which produces gifted individuals is characterized by excess of male offspring.

3. Differential death rate of embryos. Our figures for sex ratio among the gifted and their sibs are based upon living births. Nichols and others have reported some evidence that the proportion of males may be higher in miscarriages. Hospital reports have in some cases shown a third as many miscarriages as living births. The number

may be considerably greater than this, as it is impossible to secure accurate data on the mortality of embryos within the first few weeks after conception. If the ratio of males to females for all conceptions were 120 to 100, and if the mortality rate of male and female embryos were 30 per cent and 20 per cent, respectively, then the sex ratio of living births would be 105 to 100 (or approximately that which obtains for the general population). Assuming the same sex ratio for all conceptions, but a mortality rate of 15 per cent for male and 10 per cent for female embryos, then the sex ratio of living births would be 113.3 males to 100 females. It is evident, therefore, that a reduction of 50 per cent in miscarriages, using this term in the broad sense, might affect considerably the sex ratio of living births.

We find that in the families reporting one or more miscarriages there were, of living births, 183 boys and 160 girls; a ratio of 114.3 to 100, or 53.4 per cent of males and 46.6 per cent of females. In the families reporting no miscarriages there were 466 boys and 380 girls; a ratio of 122.6 to 100, or 55.1 per cent of males and 44.1 per cent of females. The S.D. of the first proportion is 2.69; of the latter, 1.71. The excessive proportion of boys in the families reporting no miscarriages may very well be significant. If mothers of the gifted group on the whole have excelled mothers of the generality in the ratio of live births to conceptions, the excess of gifted boys would readily be accounted for.

4. *Sex difference in variability.* The most common explanation of findings such as we are here concerned with is that the human male is more variable than the female. However, the mental test data bearing on sex variability are so inconsistent that it would be hard to say which way the weight of evidence inclines. On the hypothesis of sex difference in variability one would expect to find the highest intelligence scores in our gifted group earned by boys. This, however, is not the case in all groups. In the main experimental group the three highest IQ's (corrected) were earned by girls. Both in Table 3 (uncorrected IQ's) and Table 4 (corrected IQ's) the means for the sexes are almost identical. The variability of the girls is in each case slightly greater than that for boys, but the difference is too small to be considered significant, the difference between the S.D's in the case of the corrected IQ's being only 0.82 times the

S.D. of the difference, which is 1.06. The proportions of each sex found at or above various levels are for the corrected IQ's as follows:

	160 or above	170 or above	180 or above	190 or above
Boys	18.5%	6.2%	2.6%	0.0%
Girls	16.5%	7.2%	2.0%	1.0%

However, except for the non-excess of boys in the highest IQ ranges, the facts we have presented are in harmony with the hypothesis that exceptionally superior intelligence occurs with greater frequency among boys than among girls. That the sibs of the gifted show even a greater excess of boys than do the gifted themselves may seem at first thought to argue against this hypothesis. Actually it supports it. If children are selected for a given trait, and that trait is more common in boys than in girls, it follows that a greater proportion of families consisting of girls only will be missed, with the result that the sibs of the children selected for the trait will also show an excess of boys. It can be shown, for example, that if the true sex ratio in a general population is 1 to 1, and the trait in question occurs in one-half of boys and one-third of girls, the families of children selected for the trait will yield a sex ratio of 111 boys to 100 girls, not 100 to 100.[1]

The true cause of the sex ratio found can not be determined from our data. It may be either variability or the differential death rate of embryos. Both of these factors may be involved and possibly others. Biased selection due to the method of nomination and testing is probably not responsible.

[1]The author is indebted to Professor C. H. Danforth, of the Department of Anatomy, Stanford University, for pointing out this selective factor and for the deviation of the apparent ratio in this illustration.

CHAPTER IV

RACIAL AND SOCIAL ORIGIN[1]

Racial Origin

The chief data on racial origin consist of replies by the child's parents to the following question asked in the Home Blank regarding each of the child's grandparents: *Father's father's descent (for example, English and Scotch, German, Dutch and French, Russian Jewish, etc.)*

The question was answered for 85 per cent of the grandparents of those for whom the Home Blanks had been returned at the time tabulations were made. In tabulating the replies, a credit of two points was allowed for each grandparent, or one point for each great-grandparent, making a total of 8 points for each child. The points were then totaled by nationality or race for each grandparent and reduced to per cents, as shown in Table 8.

Table 8.

Racial Origin of Main Gifted Group

(Per cent of grandparents of each racial or nationality group)

Racial Stock	Per cent of total	Racial Stock	Per cent of total
English	30.7%	Austrian	1.3%
German	15.7%	Norwegian	0.9%
Scotch	11.3%	Danish	0.9%
Irish	9.0%	Japanese	0.6%
French	5.7%	Swiss	0.6%
Russian Jewish	3.8%	Spanish	0.3%
German Jewish	1.8%	Bohemian	0.3%
Polish Jewish	0.8%	Russian	0.3%
Roumanian Jewish	0.2%	Hungarian	0.3%
French Jewish	0.2%	Roumanian	0.3%
Lithuanian Jewish	0.1%	Flemish	0.3%
Austrian Jewish	0.1%	Armenian	0.3%
Bohemian Jewish	0.1%	Portuguese	0.3%
Jewish, not classified	3.4%	Alsatian	0.1%
Total Jewish	10.5%	Negro	0.1%
Scotch Irish	2.8%	Indian	0.1%
Swedish	2.5%	Mexican	0.1%
Italian	1.4%	Syrian	0.1%
Welsh	1.4%	Icelandic	0.1%

[1]Written with the assistance of Florence L. Goodenough.

It is unfortunate that no very reliable data on the relative frequency of the different racial stocks represented in the cities covered by the main survey are available. However, even without such comparative figures certain items in Table 8 stand out as significant. The percentage of Scotch is very high, as is also that of the Jewish groups, especially the Russian Jews. The English stock heads the list, but this is also probably true in the general population. The percentage of Latin blood is very low.

The proportion of Jewish blood, as it is reported, is 10.5 per cent of the total. The actual amount is probably greater than this, as there is reason to believe that the presence of Jewish blood has in some cases been concealed. According to the estimates of a number of prominent Jewish social workers, the proportion of Jews in the total population of the three main cities covered (Los Angeles, San Francisco, and Oakland) is approximately 5 per cent. According to this estimate, the amount of Jewish blood in our group is about twice the expected.

Negroes represent 2 per cent of the total of the combined population of Los Angeles, San Francisco, Oakland, Alameda, and Berkeley, and furnish three-tenths of one per cent of our gifted group (two cases). As these cases are both part white (exact proportion of white blood is not known) they account for less than three-tenths of one per cent of the ancestral units in Table 8.

In regard to the absence of Chinese, it should be noted that the Oriental schools which the Chinese children attended were not canvassed. Tests made by K. T. Yeung of 105 unselected Chinese children (chiefly of the ages 9 and 11) in the Oriental school of San Francisco gave a median IQ of 97, with one case testing above 135. These results compare well with those for unselected white children in California, especially if any allowance is made for the language handicap.[1]

The mentality of Japanese children in California has recently been very thoroughly investigated by Professor M. L. Darsie, who finds little evidence that the Japanese are inferior to California white children.[1] Professor Darsie gave

[1]K. T. Yeung: The Intelligence of Chinese Children in San Francisco and Vicinity. *J. of Applied Psychology*, 1921, pp. 267–274.

Binet, Beta, and Stanford Achievement tests, using unselected age groups of 10 to 15 years, to nearly half of the Japanese children of these ages in the entire State. The results for the urban group gave a median IQ of about 90, with Q of 10.2. For 129 cases in the larger cities the median was 99. That the Binet median was largely affected by the language factor is indicated by the fact that the Beta median was slightly *above* that of unselected white children. In agreement with this is the fact that the median educational quotient of the Japanese children on the Stanford Achievement test was about 95; also the fact that the ratings given these children by the teachers for general quality of school work was fairly high. The remarkable outcome of one Japanese-white marriage is set forth in some detail in Chapter 5.

The total population of Latin extraction in the cities covered is not known, but it is certainly very large in comparison with the number of Latin children in our group. Intelligence tests of many Latin groups in America have yielded consistently low scores, with a median IQ usually between 75 and 85. Perhaps a median IQ of 80 for the Italian, Portuguese, and Mexican school children in the cities of California would be a liberal estimate.[2] How much of this inferiority is due to the language handicap and to other environmental factors it is impossible to say, but the relatively good showing made by certain other immigrant groups similarly handicapped would suggest that the true causes lie deeper than environment.

Examination of the statistical probabilities will show that even a moderate difference in the mean IQ of two race or nationality groups is sufficient to cause very large differences in the proportion of individuals testing at either extreme. The mean IQ of California white children residing in urban communities is approximately 100, and the P.E. of the distribution is approximately 10. On the basis of a normal distribution, the expected frequency of children testing as high as 140 would be 35 in 10,000, or one individual in 286. If the mean IQ were 90 and the P.E. of the distribution were still 10, the proportion of cases reaching 140 would be only

[1]M. L. Darsie: The Mental Capacity of American Born Japanese Children. *Comparative Psychology Monographs,* 1925.

[2]See Kimball Young: Mental Differences in Certain Immigrant Groups. *University of Oregon Publications,* 1922, p. 103.

3.8 in 10,000, or one in 2,632. If the mean of 90 were accompanied by a P.E. of about 9, as would most probably be the case, the proportion reaching 140 would be much less than 1 in 2,632. One can at least say that a mean IQ of 90 is not likely to produce more than a tenth as many individuals above 140 as a mean IQ of 100 will produce.

Table 9 gives for the gifted group and for the general population of the cities canvassed the proportion of "native white of native parentage," "native white of foreign or mixed parentage," and "foreign white parentage." The figures for the population are taken from the 1920 census returns for "males and females 21 years or over." As would be expected, there are no significant differences in the parentage of gifted boys and gifted girls, but the gifted rank higher than the general population in the proportion classed as "native white of native parentage," the ratio being about 5 to 4.

TABLE 9.

PARENTAGE OF GIFTED COMPARED WITH ADULTS OF THE GENERAL POPULATION

	Native white of native parentage		Native white of foreign or mixed parentage		Foreign white parentage		Negro parentage	
	Male	Female	Male	Female	Male	Female	Male	Female
Adults in General pop.	39%	42%	25%	29%	33%	26%	2%	2%
Parents of Gifted boys	51%	52%	26%	27%	23%	21%	0.3%	0.3%
Parents of Gifted girls	48%	50%	24%	29%	27%	20%	0.4%	0.4%

BIRTHPLACE OF FOREIGN BORN PARENTS OF GIFTED

The birthplaces of 248 foreign born white parents of our gifted are given in Table 10. The figures for the Japanese are added for comparative purposes. The fourth column gives the per cent contributed by each country to the total foreign born white parents of our gifted; Column 5, the per cent contributed by each country to the total foreign born population of Los Angeles and San Francisco; Column 6 shows to what extent each number in Column 4 exceeded or fell short of its quota as shown in Column 5.

TABLE 10.

BIRTHPLACE OF 248 WHITE FOREIGN BORN PARENTS OF GIFTED CHILDREN

	(1) Fathers	(2) Mothers	(3) Total	(4) Per cent of white foreign born parents of gifted	(5) Per cent of total foreign in general population	(6) Per cent of quota among parents of gifted
Armenia	2	–	2	0.8%	0.3%	267%
Australia	3	3	6	2.4%	0.8%	300%
Austria	4	4	8	3.2%	2.3%	139%
Belgium	2	1	3	1.2%	0.4%	300%
Canada	14	15	29	11.7%	8.2%	143%
Denmark	3	1	4	1.6%	2.1%	76%
England	12	13	25	10.1%	8.6%	117%
France	4	6	10	4.0%	3.8%	105%
Germany	15	12	27	10.9%	11.5%	95%
Hungary	2	2	4	1.6%	1.2%	133%
Ireland	7	3	10	4.0%	9.2%	43%
Italy	3	2	5	2.0%	12.6%	16%
Mexico	–	1	1	0.4%	10.1%	4%
Netherlands	3	–	3	1.2%	0.6%	200%
Norway	5	2	7	2.8%	1.9%	147%
Poland	3	5	8	3.2%	1.7%	188%
Roumania	7	7	14	5.6%	0.7%	800%
Russia	35	25	60	24.2%	6.1%	397%
Scotland	3	4	7	2.8%	2.5%	112%
South America	1	–	1	0.4%	0.4%	100%
Spain	1	–	1	0.4%	1.3%	31%
Sweden	5	5	10	4.0%	4.5%	89%
Wales	1	–	1	0.4%	0.4%	100%
Pacific Islands	–	2	2	0.8%	0.3%	267%
			248	99.7%		
Japanese	6	4	10	0.8%	1.6%	50%

In comparing the per cents in Column 6, it is necessary to bear in mind the small numbers in Column 3 upon which they are based. This applies especially in those cases in which the per cent in Column 5 is also small. The great excess over the quota for Russia (Russian Jews?) and the enormous deficiency below the quota for Spain and Italy, are, however, very significant.

Birthplace of American Born Parents and Grandparents of Gifted

A separate space was provided in the Home Blank for recording the birthplace of each parent and each grandparent. Replies definite enough for tabulation were received for 581 fathers and 583 mothers, or more than 90 per cent of the full number for the main experimental group and more than 95 per cent of the number returning Home Blanks. Following are the proportions of the American born and foreign born parents from cities, towns, and country in the cases for which the information was available. The classification of cities by population is based on the 1890 census for parents, and that of 1860 for grandparents.

	N	Cities of 10,000 or over	Cities and towns of 1,000 to 10,000	Rural, less than 1,000
Fathers	581	48.4%	23.7%	27.9%
Mothers	584	52.4%	22.3%	25.3%
Both	1165	50.4%	23.0%	26.6%
Grandparents	639	36.3%	34.9%	28.8%

Birthplace of Grandparents. The data on birthplace of grandparents are less complete and less accurate than for the parents. However, there were 639 American born grandparents whose birthplaces as reported were classifiable. Foreign born grandparents were omitted from this comparison because of the difficulty of obtaining population data.[1] Whether we consider the parents or the grandparents, there is a much larger number of cases in the urban groups than was true for the general population at the two periods (1890 and 1860). However, the significance of this fact is not very clear, since the gifted subjects whose parents and grandparents we are considering were resident in cities. Figures based upon gifted children found in rural schools would undoubtedly be very different. Perhaps the point of greatest

[1]In classifying American born grandparents a case was included under "rural" if only state and county of birthplace had been reported (e.g., Erie Co., Pennsylvania). If state only was reported the case was thrown out unless additional evidence from other parts of the blank made the classification fairly certain. If in such a case the occupation of the grandfather was given as "farmer" the birthplace was recorded as rural. This procedure seemed justifiable in order to counterbalance the natural tendency to remember and report urban birthplaces more frequently than rural because of the greater importance of the places.

interest is the fact that, notwithstanding the small urban population in the United States in 1860, the per cent of grandparents of rural birth is as low as that for parents.

The birthplaces of American born parents of our gifted were tabulated by state, and although the figures have little significance in the absence of accurate comparative data for the general population of the cities canvassed, they are given for whatever they may be worth.

TABLE 11.

BIRTHPLACE OF AMERICAN BORN PARENTS BY STATE

State	N	Per cent of Amer. born	State	N	Per cent of Amer. born
Alabama	6	0.7%	Nevada	5	0.5%
Arizona	3	0.3%	New Hampshire	4	0.4%
Arkansas	2	0.2%	New Jersey	6	0.7%
California	253	27.7%	New Mexico	3	0.3%
Colorado	21	2.3%	New York	63	6.9%
Connecticut	5	0.5%	North Carolina	3	0.3%
Delaware	2	0.2%	North Dakota	0	0.0%
Dist. of Columbia	2	0.2%	Ohio	51	5.6%
Florida	0	0.0%	Oklahoma	2	0.2%
Georgia	6	0.7%	Oregon	10	1.1%
Idaho	2	0.2%	Pennsylvania	37	4.1%
Illinois	69	7.6%	Rhode Island	0	0.0%
Indiana	27	3.0%	South Carolina	2	0.2%
Iowa	50	5.5%	South Dakota	2	0.2%
Kansas	39	4.2%	Tennessee	11	1.2%
Kentucky	5	0.5%	Texas	18	2.0%
Louisiana	3	0.3%	Utah	7	0.8%
Maine	5	0.5%	Vermont	2	0.2%
Maryland	6	0.7%	Virginia	6	0.7%
Massachusetts	15	1.6%	Washington	4	0.4%
Michigan	35	3.8%	West Virginia	2	0.2%
Minnesota	28	3.1%	Wisconsin	24	2.6%
Mississippi	6	0.7%	Wyoming	0	0.0%
Missouri	35	3.8%	Hawaii	1	0.1%
Montana	4	0.4%			
Nebraska	20	2.2%	Total	912	99.4

OCCUPATION OF FATHERS

In the Home Blank, spaces were provided for reporting "father's main occupation at successive ages," including age when each occupation that had been followed was begun, and the number of years it was followed. The replies were sufficiently definite for 560 fathers in the main group to per-

mit of classification of occupation. The method of classification employed is that used in the U. S. census report: professional, commercial, industrial, and public service, with sub-groups under each. The results are as follows for the "main occupation" of fathers at the time the report was made:

Professional Group:			
Lawyers		33	
Engineers (with college degrees)		28	
Teachers (total 30)		30	
In colleges and universities	10		
High school	13		
Elementary	3		
Unclassified	4		
Physicians and surgeons		23	
Clergymen		15	
Writers		9	
Dentists		9	
Musicians		6	
Architects		3	
Inventors		2	
Other professions		5	
Total professional			163
Proportion of all fathers			29.1%
Commercial Group:			
Executives and managers		92	
Salesmen and insurance agents		43	
Retail dealers (small stores)		38	
Clerical workers		38	
Wholesale dealers, brokers, and owners of large retail establishments		19	
Manufacturers		11	
Druggists		8	
Editors and publishers		5	
Expert accountants		5	
Total commercial			259
Proportion of all fathers			46.2%
Industrial Group:			
Carpenters		16	
Mechanics and machinists		14	
Tailors		7	
Painters		6	
Contractors		5	
Barbers		5	
Florists		4	
Telegraph operators		3	

Butchers	3	
Photographers	2	
Farmers	2	
Lithographer	1	
Foreman	1	
Pattern maker	1	
Landscape gardener	1	
Sea captain	1	
Baker	1	
Potter	1	
Cobbler	1	
Practically unskilled, including such occupations as teamster, expressman, waiter (1), day laborer (1), etc.	38	
Total industrial		113
Proportion of all fathers		20.2%
Public Service Group:		
Postmen and postoffice clerks	8	
City firemen	4	
Army and Navy officers	3	
Soldiers and sailors	3	
Mayors	2	
Other city officials	3	
Policemen	1	
Civil service clerks	1	
Total public service		25
Proportion of all fathers		4.5%

Summary:	Proportion among fathers of gifted children	Proportion in population of Los A. and San F. (1910 census)	Per cent of quota among fathers of gifted children
Professional Group	29.1%	2.9%	1003%
Public Service Group	4.5%	3.3%	137%
Commercial Group	46.2%	36.1%	128%
Industrial Group	20.2%	57.7%	35%

In the industrial group only one man gives his occupation as "laborer," which is 0.2 per cent of our fathers as compared with 15.0 per cent of the general population classified as laborers in the census report. Accordingly, fathers of gifted children yield only one seventy-seventh of their quota for this class. The man referred to was a farmer who had moved to Berkeley and taken a position as laborer at the University of California in order that his children might attend college.

Re-grouping according to Taussig's five-grade classifications, we have the following:

1. Professional, including, besides the professions listed above, editors and publishers, army and navy officers, mayors and city officials. The total of the professional group now becomes 176.

2. Semi-professional and business group, including two sub-grades of "white collar" workers below the professional level. (a) Executives and business managers, sales and insurance agents, wholesale dealers, brokers, owners of large retail establishments, manufacturers, expert accountants, photographers, lithographers, and landscape gardeners. Total, 175. (b) Retail dealers and owners of small stores, clerical workers, druggists, contractors, florists, telegraph operators, postmen and postoffice clerks, civil service clerks. Total, 105. Total of 2(a) and 2(b), 280.

3. Skilled labor group, including carpenters, mechanics, machinists, tailors, butchers, farmers, painters, foremen, pattern makers, potters, bakers, cobblers, barbers, city firemen, soldiers, sailors, and policemen. Total, 66.

4. Semi-skilled to slightly skilled laborers, including teamsters, expressmen, waiters, etc. Total, 37.

5. Common laborer. Total, 1.

The percentage distribution for these five classes is as follows:

Professional		31.4%
Semi-professional and business		50.0%
(a) Higher group	31.2%	
(b) Lower group	18.8%	
Skilled labor		11.8%
Semi-skilled to slightly skilled		6.6%
Common labor		0.13%

The above data are in line with the findings of others on the social origin of superior ability. Some of the most important of these findings are summarized below:

Cattell, fathers of 885 leading American men of science:

Professional	43.1%	(in general population 3.0%)
Agriculture	21.2%	(" " " 41.1%)
Mfr. and trade	35.7%	(" " " 34.1%)

Edwin L. Clarke, 666 American men of letters:

Professional classes	49.2%
Commercial classes	22.7%
Agricultural classes	20.9%
Mechanical, clerical and unskilled	7.2%

Alphonse de Candolle, European men of science:

	100 Foreign Associates of the Paris Academy of Science	40 French members of both London and Berlin Academies
Noble, wealthy, gentlemanly classes	41%	28%
Middle class	52%	47%
Workers, farmers, etc.	7%	25%

Havelock Ellis, 1,030 British men and women of genius:

Upper classes (or "good family")	18.5%
Church	16.7%
Law	7.1%
Medicine	3.6%
Miscellaneous professions	7.8%
Army and navy	6.1%
Officials, clerks, etc.	3.2%
Commercial	18.8%
Crafts	9.2%
Yeomen and farmers	6.0%
Artisans and unskilled	2.5%

Perhaps only the last three classes above, including 17.5 per cent of the cases, would rank below Class 2 of Taussig. The proportion of parents of our gifted below this level is 28.6 per cent.

Galton, 107 English men of science:

Nobility and gentlemen	9 cases
Army, navy, and civil office	18 "
Professions	34 "
Bankers, merchants, manufacturers	43 "
Farmers	2 "
Others	1 "

The data most nearly comparable with our own are those of Cattell and Clarke, but the method by which our gifted subjects were selected tends to reduce the numbers for the

agricultural class and to increase somewhat those of the professional and commercial classes. Notwithstanding minor discrepancies, all of these investigations agree as to the existence of a very striking social hierarchy with respect to the production of superior individuals. There is one respect in which the contribution of the present study is unique. Earlier investigations had proved nothing more than that the upper social strata are more productive of men and women who have succeeded in achieving eminence. It has often been argued that this superiority in achievement should be credited for the most part to the larger opportunity for achievement enjoyed by members of the favored classes. *Our data show that individuals of the various social classes present these same differences in early childhood, a fact which strongly suggests that the causal factor lies in original endowment rather than in environmental influences.*

Barr Scale Ratings of Occupational Status

In order to arrive at a more accurate determination of the occupational status of the fathers of our gifted children, we have made use of the Barr scale of occupational intelligence. What we want is a hierarchy of the occupations with respect to the relative demands which they make upon intelligence. The census classification, obviously, is not intended to serve this purpose, and although anyone can take the census categories and arrange such a hierarchy for himself, there is a large probable error in any such individual arrangement. The error results partly from personal bias and partly from insufficient information regarding the actual requirement of the hundreds of occupations which exist. In order to reduce the personal equation in rating the intelligence value of occupations, Mr. F. E. Barr drew up a list of 100 representative occupations, each definitely and concretely described, and had 30 judges rate them on a scale of 0 to 100 according to the grade of intelligence which each was believed to demand. The ratings were then distributed and P.E. values were computed for all the occupations. The P.E. values express in the case of each occupation the number of units of intelligence which, according to the composite opinion of these 30 judges, the occupation demands for ordinary success.

P. E. Value	Occupation	Description
0.00	Hobo	
1.54	Odd Jobs	
2.11	Garbage Collector	
3.38	Circus roustabout	Does heavy, rough work about circus.
3.44	Hostler	Care of horses in livery, feed and sales stables.
3.57	R. R. Sec. Hand	Replaces ties, etc., under supervision.
3.62	Day Laborer	On street, in shop or factory as roustabout.
3.99	Track layer	Does heavy work under supervision.
4.20	Waterworks man	A variety of odd jobs, all unskilled.
4.29	Miner	Digger and shoveller, etc.
4.81	Longshoreman	Loads and unloads cargoes.
4.91	Farm laborer	Unskilled and usually inefficient.
4.98	Laundry worker	Various kinds of work in laundry (practically unskilled)
5.27	Bar tender	
5.41	Teamster	
5.44	Sawmill worker	Heavy work, little skill required.
5.59	Dairy hand	Milking, care of stock under supervision.
5.81	Drayman	
5.87	Deliveryman	Delivers groceries, etc., with team or auto.
6.14	Junkman	Collector of junk.
6.42	Switchman	Tending switch in R. R. yards.
6.66	Smelter worker	Metal pourers, casting collectors, etc.
6.27	Tire repairer	In general automobile repair shop.
6.85	Cobbler and shoemaker	Repairman in shoe shop.
6.86	Munition worker	Average.
6.92	Barber	Not owner. Has charge of chair.
6.93	Mov. picture operator	Operates machine which projects pictures.
7.02	Vulcanizer	Understands the process of hardening rubber.
7.05	General repairman	Repairs broken articles. Uses wood-working tools.
7.06	Ship rigger	Installing cordage system on sailing vessels, working under supervision.
7.17	Telephone operator	
7.19	Cook	In restaurant or small hotel.
7.23	Streetcar conductor	
7.24	Farm tenants	On small tracts of land.
7.30	Brakeman	On freight or passenger trains.
7.33	City fire fighter	Handles the ordinary fire-fighting apparatus.
7.39	R. R. fireman	On freight or passenger train.
7.54	Policeman	Average patrolman.
7.71	Structural steel worker	Heavy work demanding some skill.
7.73	Tel. and Tel. lineman	
7.77	Bricklayer	
7.79	Butcher	Not shop owner. Able to make cuts properly.
7.91	Baker	
8.02	Metal finisher	Polishes and lacquers metal fixtures, etc.
8.04	Plasterer	Knowledge of materials used necessary.
8.08	General painter	Paints houses, buildings and various structures.
8.22	Harness maker	
8.40	Tinsmith	Makes vessels, utensils, etc., from plated sheet metal.
8.49	Letter carrier	
8.50	Forest ranger	
8.58	Stone mason	
8.75	Plumber	Av. trained plumber employee.
8.89	Gardening, truck farming	Owns and operates small plots.
8.99	Electric repairman	Repairs elec. utensils, devices and machines.
9.28	Bookbinder	Sets up and binds books of all sorts.
9.37	Carpenter	Knows wood-working tools. Can follow directions in various processes of wood construction work.

P. E. Value	Occupation	Description
9.37	Potter	Makes jars, jugs, crockery, earthenware, etc.
9.54	Tailor	Employee in tailoring shop.
9.72	Salesman	In drygoods, hardware, grocery stores, etc.
10.11	Telegraph operator	In small town.
10.21	Undertaker	In small town. Six mo.–yr. spl. schooling.
10.26	Station agent	In small town. Acts as baggage man, freight agent, operator, etc.
10.26	Mechanical repairman	In shop or factory. Keeps machines in condition.
10.29	Dairy owner and mgr.	Small dairy, 50–100 cows.
10.53	Metal pattern maker	
10.54	Wood pattern maker	
10.54	Lithographer	Makes prints from designs which he puts on stone.
10.76	Linotype operator	
10.83	Photographer	City 1000–5000. A few months' training, experience in studio.
10.86	Detective	Traces clues, etc. Employee of detective bureau.
10.99	Electrotyper	Prepares wood cuts.
11.17	Traveling salesman	Sells drugs, groceries, hardware, drygoods, etc.
11.34	Clerical work	Bookkeepers, recorders, abstractors, etc.
11.35	R. R. Pass. Condr.	
11.51	Store kpr. and owner	Small town retail dealer gen. or special store.
11.74	Foreman	Small factory, shop, etc.
11.78	Stenographer	Writes shorthand and uses typewriter.
12.02	Librarian	In small institution or public library.
12.06	Nurse and masseur	Graduate.
12.74	Chef	Employed in large first-class hotels.
12.84	Editor	Small paper, considerable job work.
12.89	Primary teacher	No college training, 2 yrs. special training.
12.96	Landscape gardener	
13.08	Grammar grade tchr.	Normal graduate expects to make profession teaching.
13.20	Osteopath	Training equal to college graduate.
13.21	Pharmacist	In town of from 1000–5000 population.
13.29	Master mechanic	Thorough knowledge in his field of mechanics.
13.30	Music teacher	2–4 years special training, not college graduate.
13.31	Manufacturer	Employs from 10–50 men. Makes simple articles.
13.54	Dentist	Graduate. 2–5 years experience in small town.
13.58	Art teacher	In high school. Three or 4 years' special training.
13.71	Surveyor	Transit man. City or county surveyor.
13.31	Train dispatcher	Must be mentally alert.
14.45	Land owner and operator	Very large farms or ranches.
14.70	Musician	Successful player or singer in good company.
15.05	Secretarial work	Private sec. to high state or national officials.
15.14	High school teacher	Coll. or Normal grad. Not the most progressive.
15.15	Preacher	Minister in town of 1000–5000. Coll. graduate.
15.42	Industrial chemist	Thorough knowledge of the chem. of mfg. processes.
15.43	Mechanical engineer	Designs and constructs machines and machine tools.
15.71	Teacher in college	Degree A.B. or A.M. Not the most progressive.
15.75	Lawyer	In town of moderate size. Income $1000–$5000.
15.86	Technical engineer	Thorough knowledge of the processes of an industry.
16.18	Artist	High class painter of portraits, etc.
16.26	Mining engineer	Thorough knowledge of mining and extraction of metals.
16.28	Architect	Training equal to college grad.
16.58	Great wholesale merchant	Business covering one or more states.
16.59	Consulting engineer	In charge of corps of engineers.
16.64	Educational administrator	Supt. city 2000–5000 Coll. or Normal graduate.
16.71	Physician	6–8 yrs. prep. above H. S. Income $5000 and up.

P. E. Value	Occupation	Description
16.91	Journalist	High class writer or editor.
17.50	Publisher	High class magazine and newspaper or periodical, etc.
17.81	University professor	Has A.M. or Ph.D., writes, teaches, and does research.
18.06	Great merchant	Owns and operates a million dollar business.
18.14	Musician	(Paderewski.)
18.33	High Nat'l official	Cabinet officers, foreign ministers, etc.
18.85	Writer	(Van Dyke.)
19.45	Research leader	Like Binet or Pasteur.
19.73	Surgeon	(Mayo Bros.)
20.71	Inventive genius	(Edison type.)

In the use of the scale it is only necessary to compare the occupation which is to be rated, with the occupations whose scale values are known, and to assign it the value possessed by the scaled occupation which it most nearly matches. Intermediate values may be used in rating occupations which do not appear in the scale. It has been found that different judges agree fairly closely in rating the intellectual demands of occupations by this scale. It can not be claimed that the Barr Scale values correspond exactly to the facts, but they unquestionably approximate the facts more closely than would the judgments of any one individual.

In rating the parents of our gifted children for occupational status, additional evidence from other parts of the blanks was taken into consideration. For example: if a man who had not had college training was reported as an "electrical engineer," the rating was changed to that of "electrician" (or "master mechanic," etc.) according to the information which was available from other sources. The reports from the field workers' visits to the homes were often found useful in this connection. All statements concerning occupations were carefully compared with other known facts before being rated, and *whenever there was doubt, a lower rather than a higher rating was assigned,* in order to counterbalance any unconscious bias which might exist in the mind of the assistant who made the ratings.

The most reliable comparatve data on this head are probably the results from the United States census. As the occupational statistics for the 1920 census were not yet available, the 1910 census classification of the adult male population of the cities of San Francisco, Los Angeles, and Oakland was used.[1]

[1]See *Report of the Thirteenth Census,* Vol. IV, pp. 560–584–600.

The problem was to compute a mean occupation rating of the entire adult male population of the above cities on the Barr Scale. Each occupation listed for these cities in the census report was rated on the Barr Scale, and each rating was multiplied by the number reported in the corresponding occupational group. The process was simply that of deriving a weighted average. Interpolations in rating were resorted to freely, and in this case, *whenever there was doubt, a higher rather than a lower rating was given.* This is the reverse of the procedure which was followed in rating the parents of our gifted, and has the effect of bringing the two groups closer together than they would have been found to be had all the facts been known. It was thought better to err, if at all, on this side.

In dealing with the census figures, the question arose as to what procedure should be followed with the very large group of adult males for whom no occupation was reported. It seemed fairly certain that, upon the whole, these persons would rank below the average of the population in general, since a large proportion of them would be day laborers, temporarily unemployed. Two population ratings were worked out: the first (A) based on the assumption that the percentage not reported in the census would have had the same distribution of occupational ratings as those reported; the second (B) by assigning to the group not reported a constant rating of 4.0 P.E., which is above that of a day laborer and corresponds closely to that of a railroad track layer. The latter is probably a generous figure.

Table 12 gives the distributions, means, and standard deviations for fathers of one gifted child, fathers of more than one, total fathers of gifted children, and adult males of the general population (the latter by two methods of calculation). In connection with columns 1 and 2, it should be noted that a majority of the siblings of our gifted group have not been tested. If all had been tested it is probable that the difference between the two columns would have been greater. As it is, the difference is 3.82 times the P.E. of the difference. In 34 cases the information regarding the father was too indefinite to permit of a Barr rating. Designations as indefinite as "teacher," "salesman," or "writer" were thrown out. It is quite certain that the omitted cases are at least not below the average of total fathers of the gifted group.

Another fact regarding Table 12 that should be noted is the absence of ratings higher than 16 for the general population (last two columns). This is due to the fact that the census descriptions of the higher professional occupations are less definite than those in the Barr Scale. More definite information would have raised the ratings of a certain proportion of the population cases here rated 16, and possibly of some rated 15 or 14, but because of the small numbers such change would not have affected to any considerable extent the average rating for the general population.

TABLE 12.

BARR SCALE RATINGS FOR FATHERS OF GIFTED AND FOR MALE ADULTS OF THE GENERALITY

Rating	Fathers of one gifted child	Fathers of more than one gifted child	Total fathers of gifted	Adult Males of General Population	
				Method A	Method B
18–18.9		2	2		
17–17.9	4	4	8		
16–16.9	37	4	41	3005	3005
15–15.9	73	17	90	4075	4075
14–14.9	55	14	69	4296	4296
13–13.9	60	6	66	6210	6210
12–12.9	6	0	6	3866	3866
11–11.9	121	20	141	75150	75150
10–10.9	17	2	19	6089	6089
9–9.9	28	2	30	37204	37204
8–8.9	17	1	18	15235	15235
7–7.9	15	3	18	15167	15167
6–6.9	11	0	11	12602	12602
5–5.9	4	1	5	27379	27379
4–4.9	1		1	17907	87671
3–3.9	1		1	22334	22334
Total	450	76	526	250519	320283
Mean	12.64	13.51	12.77	8.88	7.92
S. D.	2.77	2.71	2.78	3.24	3.38

The mean of 12.77 for total fathers of gifted corresponds fairly closely to the Barr rating of a stenographer, librarian in a small city, or primary teacher. The mean of 7.92 for the general population corresponds to the Barr rating of a plasterer, baker, or metal finisher.

Grouping the data of Table 12, we have the following comparison between total fathers of gifted and adult males of the generality (Method B):

Rating	Fathers of Gifted	Adults of the Generality
15 or above	26.8%	2.2%
12–15	26.8%	4.5%
9–12	36.1%	37.0%
6–9	8.9%	13.4%
3–6	1.3%	42.9%

Economic Status

For 170 families of the gifted Dr. Bronson obtained a statement (usually from the mother) of the approximate annual income. These families are not selected. The question was asked in consecutive cases at the time of the medical examination and less than half a dozen parents refused to answer. As will be seen from Table 13, the economic status of a majority of the families is fairly comfortable, but there are few cases of wealth. The median income reported is $3,333; the mean, $4,705. The median in this case is more significant than the mean. Sixty, or 35.3 per cent of the families, report an income below $2,500, which is probably no more than the annual earnings of the average skilled laborer in California in 1923. Only twenty-nine (17 per cent) report the income above $7,500, and seven (4.1 per cent) above $12,000. A few families in this group of 170 and several of our families not in this group are living in what might truly be called poverty.

Table 13.

Income Reported by 170 Families of Gifted Children

Families	Income
7	$12,500 to $25,000
4	11,500 " 12,500
3	10,500 " 11,500
8	9,500 " 10,500
2	8,500 " 9,500
5	7,500 " 8,500
5	6,500 " 7,500
12	5,500 " 6,500
15	4,500 " 5,500
19	3,500 " 4,500
30	2,500 " 3,500
52	1,500 " 2,500
8	500 " 1,500
Median	$3,333
Mean	4,705
S. D.	3,805

Home Ratings on the Whittier Scale

One-third of the homes of our gifted children were rated by the field assistants on the Whittier Scale for Grading Home Conditions, devised by Dr. J. Harold Williams.[1] Observations were made during conferences with parents at their homes and the pertinent facts were recorded immediately after departure. The 288 homes graded are believed to be fairly representative of the group. The scale contains a score card with directions for grading each of five different items on a scale of 5 to 1 (6 to 0 in exceptional cases): necessities, neatness, size, parental conditions, and parental supervision. The meaning of the different grades is defined in a very concrete way on the score card for each of the items graded. The sum of the separate ratings is the home index. Table 14 gives the distribution of Whittier scores for each item, with mean and standard deviation.

Table 14.

Whittier Scale Ratings of 288 Homes of Gifted Children

Items	Distribution of Ratings 0	1	2	3	4	5	6	Mean Rating	Standard Deviation
Necessities	0	0	3	26	60	184	15	4.63	.76
Neatness	0	1	5	26	65	188	3	4.54	.77
Size	0	1	8	25	60	185	9	4.55	.83
Parental Conditions	1	0	6	24	41	208	8	4.64	.81
Parental Supervision	0	1	4	27	74	153	29	4.60	.81
Total score, or index								22.94	3.00

Below are given the means in comparison with the means reported by Dr. Williams for 50 unselected homes and for 120 homes of delinquent boys.

	Unselected Homes (50)	Homes of Delinquents (120)	Homes of Gifted (288)
Necessities	4.18	2.93	4.63
Neatness	4.20	3.39	4.54
Size	4.48	3.11	4.55
Parental Conditions	4.22	2.64	4.64
Parental Supervision	3.70	1.84	4.60
Total Score	20.78	13.91	22.94

[1]Described in *The Journal of Delinquency*, Vol. 1, 1916, pp. 271–286.

In the case of the gifted, the ratings for the separate items tend to be very uniform, with a low S.D. for each. On all items the homes of the gifted rate much higher than those of delinquents, with the greatest difference in parental supervision. The unselected homes approximate those of the gifted on all items except parental supervision. The difference in mean home index of 22.9 for gifted and 13.9 for delinquents is very large.

The total ratings of the 288 homes of gifted children were distributed as follows:

Total Rating	6–8	9–11	12–14	15–17	18–20	21–23	24–26	27–29
Cases	1	1	4	7	41	86	137	11

Divorce and Separation of Parents

Data on this point are of interest not only in connection with the general quality of home environment our gifted children have enjoyed, but also as an indication of the frequency with which the parents of such children are socially unadaptable or temperamentally exceptional. The Home Blank contained the following questions:

Are parents divorced? . . . . If so, when? . . . . If not divorced, are parents separated? . . . How long separated? . . . The data thus obtained were in many cases checked up at the time of home visits. The facts as reported are as follows for the 578 families of our main group:

	N	Per cent
Divorces reported or otherwise known	30	5.2%
Parents separated	11	1.9%
Facts not known[1]	5	.8%
Families known to be unbroken	532	92.1%

There are no strictly comparable data for the general population from which these parents come. In 1916 there were 5,573 divorces and 30,996 marriages in California, or a ratio of 1 to 5.56. The ratios were as follows in the three counties with which we are here chiefly concerned:

[1]In three of the five cases the gifted child had been adopted in infancy; information regarding true parents was not obtainable, but the foster parents were living together.

Los Angeles County,	1 to 5.24
San Francisco County,	1 to 4.35
Alameda County,	1 to 4.71
The three counties combined,	1 to 4.77

However, the proportion is lower for fruitful than for barren marriages, and we are here concerned with fruitful marriages only. In regard to the 5,573 divorces granted in California in 1916, certain additional facts were available in 5,196 cases. In the case of 2,088 of these 5,196 divorces, dependent children were reported. This is 40.2 per cent. The report was "no dependent children" in the case of 57.6 per cent, while in 2.2 per cent this item was not reported. Roughly speaking, one may say that for 100 marriages in California there are 18 divorces and that in 7 (or 40 per cent) of these cases there are dependent children. Assuming that 80 of the 100 marriages are fruitful, we may take the ratio of 7 to 80 (or 8.75 per cent) as the figure with which to compare the 5.2 per cent of divorces in the families of our gifted. Making considerable allowance for various sources of error in this comparison, it seems reasonably certain that the divorce records for our 578 families are better than for the population to which they belong.

Neighborhood Ratings

Dr. Williams has devised a scale for rating neighborhoods similar to that for rating homes.[1] It is unfortunate that lack of time prevented the use of this scale for rating the neighborhood environment of our gifted. Instead, a simpler method was used. In visiting a home the field assistant observed the surroundings and recorded an unanalyzed rating of 1 to 5, as follows:

1 Very superior
2 Superior
3 Average
4 Inferior
5 Very inferior

The average rating of 305 neighborhoods, chiefly those in which the homes that had been rated were located, was 2.25, S.D. 0.94. The distribution was as follows:

[1]A Scale for Grading Neighborhood Conditions, Bulletin No. 5, Department of Research, Whittier State School, Whittier, California, 1917, p. 17.

Very superior	76
Superior	108
Average	92
Inferior	28
Very inferior	1

No comparative data for unselected homes are available, but if the ratings have been given as intended by the scale, the average neighborhood in which the gifted child resides is about the same as the average for the cities in question. We have seen that the average *home index,* however, is very superior, notwithstanding the modest average income. The conclusion seems to be that although the financial status of the parents of the average gifted child is such as to necessitate living in an average neighborhood, the intelligence and character of the parents are such as to insure that the internal conditions of the home will be above the average. The data presented later in this chapter on the education of parents support this conclusion.

School Reports on Home Environment

In the School Blank the teacher was asked to give *significant facts regarding the child's home environment* (*e.g., imperfect parental control, excessive indulgence, undue severity, systematic home instruction, unsuitable companions,* etc.). The question was answered for 417 gifted children and for 319 of the control group (unselected children).[1] The results were tabulated separately by sex, but have been here combined, as no significant sex differences were found. It should be noted that the wording of the question is such as hardly to call for a reply unless "significant facts" regarding the child's home environment were known to the teacher; also that the question is especially designed to bring to light unfavorable conditions. Probably in a large majority of cases failure to answer the question means that no especially significant facts, particularly facts of an unfavorable nature, were known to the teacher. However, the percentages have been based on the number for whom the question was answered. Probably the most significant fact is that unfavorable home conditions were mentioned for only 8.6 per cent

[1]See pp. 177–178 for description of this control group.

of the gifted as compared with 24.1 per cent for the control group.

TABLE 15.

SCHOOL REPORTS ON HOME ENVIRONMENT

	Gifted		Control	
	N	Per cent	N	Per cent
Replies received	417		319	
A. Probably favorable circumstances	355	85.1%	197	61.8%
1. Systematic home instruction	181	43.4%	98	30.7%
2. "Good environment"	171	41.0%	97	30.4%
3. Well educated parents	3	0.7%	0	0.0%
4. Travel, excellent associations	0	0.0%	1	0.3%
5. Excellent companions	0	0.0%	1	0.3%
B. Probably unfavorable circumstances	36	8.6%	77	24.1%
1. Excessive indulgence	14	3.4%	14	4.4%
*2. One or both parents dead	5	1.2%	14	4.4%
*3. Parents divorced	2	0.5%	2	0.6%
4. "Poor home conditions"	2	0.5%	8	2.5%
5. Imperfect parental control	6	1.4%	12	3.8%
6. Foreign home	3	0.7%	10	3.1%
7. Unsuitable companions	0	0.0%	2	0.6%
8. Undue severity	1	0.2%	9	2.8%
9. Child obliged to care for home	0	0.0%	2	0.6%
10. Has to look after himself	1	0.2%	3	0.9%
11. Left to care of nurse	2	0.5%	0	0.0%
12. Family below average mentality	0	0.0%	1	0.3%
C. Unclassified	26	6.2%	45	14.1%
1. "Average home"	14	3.4%	31	9.7%
2. Miscellaneous minor comments	12	2.8%	14	4.4%

* These two items are incomplete. Probably these represent cases which have attracted teachers' attention because of unfortunate associated circumstances or results.

PAID EMPLOYMENT OF GIFTED CHILDREN

In the Home Blank suitable spaces were provided for reporting the paid employment the child had had, together with kind, age when begun, number of hours weekly, and length of time continued.

Of 330 boys, 52, or 16 per cent, have at some time had paid employment outside the home. In addition to this, another 16 per cent have received payment for definite services within the home or to immediate neighbors.

Of 273 girls, 5, or less than 2 per cent, have been employed outside the home, and 33 have been paid for services within the home.

Salaries range from trifling sums up to $400 a week, the latter for motion picture stars.[1]

Ages at the time of first employment range from two years (in motion pictures) up to twelve.

Kinds of employment (outside of home):

	No. Cases
1. Paper routes	30
2. Delivery boy, errand boy	12
3. Motion pictures or stage work	7
4. Clerk in store	5
5. Church choir	2
6. Miscellaneous minor employment	21
Total	77
More than one kind of employment listed for same child	20
Total cases	57

Education of Parents and Grandparents

The data for parents consist of reports on the following item in the Home Blank: *Draw a line under the highest school grade reached: Father: 1, 2, 3, 4, 5, 6, 7, 8; High School 1, 2, 3, 4; College 1, 2, 3, 4; Post Grad. Other kinds of schools attended by father, and length of time* . . . . . The question was asked separately for mothers. For each grandparent the question asked was simply: *Extent of education (school grade reached).* . . .

The figures of Table 16 may be too low, owing to a natural tendency to interpret the term "grade reached" as meaning grade completed. It will be noted that the median grade reached by the parents was 12.1 (which falls just within the first year of college) and that there was little difference between the amount of schooling of fathers and mothers.

[1]The most famous of child movie stars is known to have tested above 140 IQ, but we failed to secure the coöperation of his parents to the extent of having him included in our gifted group.

TABLE 16.

SCHOOLING OF PARENTS AND GRANDPARENTS OF GIFTED CHILDREN

Parents	Reported "No Schooling"	Elementary School								High School				College				Post-Grad.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	
Fathers of Gifted Boys	5	–	–	1	1	4	2	8	51	22	20	24	57	7	10	6	47	35
Fathers of Gifted Girls	–	–	3	2	3	2	12	9	52	15	22	12	40	4	8	12	27	25
Mothers of Gifted Boys	2	–	–	–	1	2	11	8	46	23	25	21	86	15	17	13	25	17
Mothers of Gifted Girls	–	–	4	2	2	1	6	3	49	16	20	17	66	12	18	11	22	10
All Parents	7	–	7	5	7	9	31	28	198	76	87	74	249	38	53	42	121	87
Grandparents																		
All Grandfathers	9	3	5	1	13	10	22	15	290	23	14	0	97	22	23	5	124	16
All Grandmothers	11	2	1	3	11	11	23	17	329	54	34	3	132	14	14	4	27	1
All Grandparents	20	5	6	4	24	21	45	32	619	77	48	3	229	36	37	9	151	17

The central tendencies and variabilities for the data of Table 16 are as follows:

	Amounts of Schooling in Grades		
	Median	Mean	S. D.
Fathers of Gifted Boys	12.2	12.6	3.99
" " " Girls	11.3	11.8	3.74
Mothers " " Boys	12.2	11.9	3.10
" " " Girls	12.2	11.9	3.36
All Parents	12.1	11.8	3.46
All Grandfathers	8.9	10.8	4.05
All Grandmothers	8.8	9.7	2.84
All Grandparents	8.9	10.0	3.42

Parents had had schooling in addition to that shown in Table 16 as follows:

Business School	114
Normal School	48
Law School (not included under college)	26
Evening School	21
Medical School (not included under college)	18
Conservatory of Music	16
Art School	10
Dramatic School	9
Technical School	8
Nurses' Training School	7
Travel and Study abroad	7
Miscellaneous	49
Total	333
Per cent of total group	27.5%

Reports are available for only about two-thirds of the grandparents. Table 16 shows the median grade reached by the grandfathers and grandmothers to be 8.9, or nearly through the ninth grade. However, the *mean* for the grandfathers is 10.8 as compared with 9.7 for the grandmothers. If the schooling of all grandparents had been reported, the means and medians would probably have been lower.

The Home Blank provided separate spaces for reporting the college degrees each parent had obtained and where they were obtained. In treating the results on this item only colleges and universities of recognized standing were included. All degrees requiring less than four years of study after high school graduation were excluded (as D.D.S.; also D.D., when it was obtained from a theological seminary of less than standard college grade). For this reason, the per cents given below are somewhat lower than they would have been had they been based on the data of Table 16.

	Number of children	Per cent of all children
Father, only, holds degree	98	16.2%
Mother, only, holds degree	18	3.0%
Both parents hold degree	44	7.3%
One or both parents hold degree	160	26.4%

That is, more than a quarter of these children have at least one parent who is a college graduate. There were 204 individual parents who were college graduates, which is 16.9 per cent of the entire number. There are no comparative data on the proportion of adults of corresponding age in the general population who are college graduates, but it is doubtful whether it would be more than one-fifteenth or one-twentieth of the proportion found for this group.

The median amount of schooling for the native born white draft of the United States army in the recent war, as given in the official report[1] was 6.9, or not quite through the seventh grade. For the same group the proportion of college graduates was approximately 1 per cent. The figures reported for the army agree closely with those of Thorndike based upon school reports.[2] In neither case, however, are the data exactly comparable with those for parents of our gifted. These should be compared with adults in the generality of corresponding age. The mean age of the United States army draft of 1917 and 1918 was probably fifteen years lower than that of the parents of our gifted, and as the mean amount of schooling in the general population has risen considerably in recent years, the showing made by our parents is even better than it at first appears.

Size of Home Library

One indication of the cultural status of a home is the number of books it contains. The Home Blank contained the following item: *Jot down a rough estimate of the number of books in the home library* . . . . . This information was sought primarily for its significance in connection with individual children, but the figures are also of interest for the group. Unfortunately, no comparative data are at hand for unse-

[1]Psychological Examining in the U. S. Army. *Memoirs of the National Academy of Science*, Vol. 15, p. 761.

[2]E. L. Thorndike: The Elimination of Pupils from School. *U. S. Bur. of Educ. Bull.*, 1907, No. 4.

lected children, but such would probably show but a small fraction of the mean (328) reported for our gifted. The results for the 547 children for whom reports are available are as follows:

	No.	Per cent
"No books"	7	1.1%
10 or fewer	15	2.3%
25 " "	41	6.4%
50 " "	119	18.5%
100 " "	215	33.4%
500 or more	106	16.5%
750 " "	57	8.9%
1000 " "	43	6.7%
2000 " "	6	0.9%

Total range reported, 0 to 6000	
Median	202
Mean	328
S. D.	458

It is impossible to say how seriously the above reports have been affected by constant errors in the direction of overestimate or underestimate. It is unlikely that serious intentional exaggeration occurred in many cases, but it is conceivable that honest estimates of this kind tend to run either too high or too low.

Summary

1. Data on racial origin indicate that, in comparison with the general population of the cities concerned, our gifted show a 100 per cent excess of Jewish blood; a 25 per cent excess of parents who are of native parentage; a probable excess of Scotch ancestry; and a very great deficiency of Latin and negro ancestry.

2. Half of the parents were born in cities of 10,000 population or over, and almost a quarter in cities or towns of 1,000 to 10,000, leaving only a quarter for rural districts and towns or villages of less than 1,000. The grandparents were only slightly oftener of rural origin than were the parents.

3. Classification of the occupations of fathers into the five grades of Taussig gave 31.4 per cent for Class I (professional); 50 per cent for Class II (semi-professional and business); 11.8 per cent for Class III (skilled labor); and a total of 6.8 per cent for Classes IV and V (semi-skilled and

unskilled labor). Earlier investigations have shown that social class is highly correlated with adult achievement; this study shows that it is highly correlated with intelligence in fairly early childhood.

4. Ratings of the occupations of parents on the Barr Scale give a mean which is very far above the mean Barr rating for the general population.

5. The median income of 170 random homes of the gifted was $3,333, with mean of $4,705 and S.D. of $3,805.

6. Ratings of 288 random homes of the gifted on the Whittier Scale for home grading yielded a mean score above that for unselected homes, and far above that for homes of delinquent boys.

7. In the case of 5.24 per cent of families of the gifted, the parents are divorced, and in the case of 1.9 per cent they are separated. These figures are lower than those for fruitful marriages in the general population of California.

8. The neighborhoods in which 305 random homes of gifted children were located gave a mean rating of only a little above "average."

9. The school reports unfavorable home conditions for only 8.6 per cent of the gifted group, as compared with 24.1 per cent of the control group.

10. Approximately 16 per cent of our boys and 2 per cent of our girls have at some time had paid employment outside the home. The maximum salary was $400 a week.

11. The mean amount of schooling for both fathers and mothers is approximately 12 grades, with S.D. of about 3.5 grades. The mean for grandfathers is 10.8, and for grandmothers, 9.7. The average parent of the gifted child has covered about twice as many school grades as the average adult in the population.

12. A quarter of our subjects have at least one parent who is a college graduate, and about 17 per cent of the parents hold a degree from a college of standard grade.

13. Libraries in the homes of our subjects range in size from 0 to 6,000 books, with median of 202 and mean of 328 (S.D. 458).

14. The data of this chapter offer considerable indirect evidence that the heredity of our gifted subjects is much superior to that of the average individual.

CHAPTER V

INTELLECTUALLY SUPERIOR RELATIVES[1]

It has thus far not been possible to undertake an extended study of the heredity of our gifted children, but the facts presented in the preceding chapter indicate that a majority have sprung from families of distinctly better than average ability. The purpose of this chapter is to summarize such information as we have been able to secure with reference to the frequency of gifted relatives. Four pages (8½×11 inches) of the Home Information Blank were devoted to questions regarding family history.[2] The questions follow:

13. LIVING BROTHERS AND SISTERS of this child: (Mark with cross (×) any half-brothers or sisters)

First name	Boy or girl	Present age	School grade reached	Intelligence of each compared with this child	Occupation if not in school
1.					
2.					
3.					
4.					
5.					
6.					

14. DECEASED BROTHERS AND SISTERS: (Mark with cross any half-brothers or sisters)

Boy or girl	Age at death	School grade reached	Cause of death	Intelligence of each as compared with this child
1.				
2.				
3.				
4.				

15. Is child's FATHER living or dead?.....Age at death..... Cause.....

16. Is child's MOTHER living or dead?.....Age at death..... Cause.....

17. Are parents divorced?.....If so, when?.....

18. If not divorced, are parents separated?.....How long?.....

V. FATHER'S RELATIVES.

1. FATHER'S FATHER: Name..... Birthplace.....

(a) Age if living..... If dead, give age at death..... Cause of death.....

(b) Descent (for example, English and Scotch, German, Dutch and French, Russian Jewish, etc.) .....

[1]Written with the assistance of Florence L. Goodenough.

[2]A part of the information thus collected has been presented in other chapters.

(c) His occupation or occupations.....

(d) Extent of his education (school grade reached).....

(e) As compared with the strictly average person, was his intelligence very superior, superior, average, inferior, very inferior? (Underline)
Add any other information you can that would help to give an idea of his intelligence

.....

.....

(f) His special interests, hobbies, or accomplishments.....

.....

.....

(g) Positions of honor, trust, or recognition.....

.....

.....

(h) His outstanding characteristics.....

.....

.....

2. FATHER'S MOTHER: Maiden name..... Birthplace.....

(a) Age if living..... If dead, give age at death..... Cause of death.....

(b) Of what descent?.....

(c) Her occupation or occupations.....

(d) Extent of her education (school grade reached).....

(e) As compared with the strictly average person, was her intelligence very superior, superior, average, inferior, very inferior? (Underline)
Add any other information you can that would help to give an idea of her intelligence

.....

.....

(f) Her special interests, hobbies, or accomplishments.....

.....

.....

(g) Positions of honor, trust, or recognition.....

.....

.....

(h) Her outstanding characteristics.....

.....

.....

3. FATHER'S BROTHERS AND SISTERS: (Mark with cross any half brothers or half-sisters)

Name	Occupation	Living or dead	Present age (or age at death)	Cause of death	Intelligence very superior, superior, average, inferior, or very inferior?
1.					
2.					
3.					
4.					
5.					
6.					
7.					

4. Relatives more distant (on FATHER's side) of exceptional ability. Give relationship to FATHER, and state accomplishments.....

5. What occupations have been most common on FATHER's side?.....

6. Please answer this item fully regarding relatives on FATHER's side. (Information is confidential.)

Were any insane?.....Number.....Relationship to father.....
Were any decidedly "queer"?.....Number.....Relationship to father.....
Were any epileptic?.....Number.....Relationship to father.....
Were any mentally backward?.....Number.....Relationship to father.....
Did any commit suicide?.....Number.....Relationship to father.....

7. Other information regarding FATHER's relatives.....

VI. MOTHER'S RELATIVES.

1. MOTHER'S FATHER: Name..... Birthplace.....
(a) Age, if living..... If dead, give age at death..... Cause of death.....
(b) Of what descent?.....
(c) His occupation or occupations.....
(d) Extent of his education (school grade reached).....
(e) As compared with the strictly average person, was his intelligence very superior, superior, average, inferior, very inferior? (Underline)
Add any other information you can that would help to give an idea of his intelligence
(f) His special interests, hobbies, or accomplishments.....
(g) Positions of honor, trust, or recognition.....
(h) His outstanding characteristics.....

2. MOTHER'S MOTHER: Maiden name..... Birthplace.....
(a) Age, if living.....If dead, give age at death..... Cause of death.....
(b) Of what descent.....
(c) Her occupation or occupations.....
(d) Extent of her education (school grade reached).....
(e) As compared with the strictly average person, was her intelligence very superior, superior, average, inferior, very inferior? (Underline)
Add any other information you can that would help to give an idea of her intelligence

(f) Her special interests, hobbies, or accomplishments.....

.....

.....

(g) Positions of honor, trust, or recognition.....

.....

.....

(h) Her outstanding characteristics.....

.....

.....

3. MOTHER'S BROTHERS AND SISTERS: (Mark with cross any half-brothers or half-sisters)

Name	Occupation	Living or dead	Present age (or age at death)	Cause of death	Intelligence very superior, superior, average, inferior, or very inferior?
1.					
2.					
3.					
4.					
5.					
6.					
7.					

4. Relatives more distant (on MOTHER's side) of exceptional ability. Give relationship to MOTHER and state accomplishments.....

.....

.....

.....

5. What occupations have been most common on MOTHER's side?.....

.....

6. Please answer this item fully regarding relatives on MOTHER's side. (Information confidential.)

Were any insane?.....Number.....Relationship to mother.....

Were any decidedly "queer"?.....Number.....Relationship to mother.....

Were any epileptic?.....Number.....Relationship to mother.....

Were any mentally backward?.....Number.....Relationship to mother.....

Did any commit suicide?.....Number.....Relationship to mother

7. Other information regarding MOTHER's relatives.....

.....

.....

.....

.....

ON THE REMAINING PAGES GIVE ANY ADDITIONAL INFORMATION REGARDING THE CHILD WHICH YOU THINK WOULD BE OF INTEREST; FOR EXAMPLE, INDICATIONS OF SUPERIOR INTELLIGENCE, INFORMATION REGARDING EARLY MENTAL DEVELOPMENT, RELATIONS WITH OTHER CHILDREN, RELATIVES OF SUPERIOR ABILITY, CHILD'S OUTSTANDING CHARACTERISTICS, ETC.

The Home Information Blank was filled out for 94 per cent of the children in our main group, but not always with the completeness that could have been desired.[1] However, there were few questions which were not answered in as many as 90 per cent of the blanks returned. The trouble lay not so much in failure to answer, as in the failure to record all the facts that would have been significant. Sometimes the facts were not known, but frequently they were omitted simply because the parents did not consider them important. The standards of performance and culture in these families are so high that a relative who is a highly successful physician or lawyer or banker is likely to be described as of "average ability." Success is taken for granted. There were many cases of failure to mention fairly close relatives who were really distinguished. In the case of one subject, for whom seven eminent relatives were listed in the Home Blank, further investigation brought to light 34 of sufficient distinction to be included in Appleton's *Cyclopedia of American Biography* or *Who's Who!* Doubtless in many cases the mere labor of writing down the information requested was the deterring factor. The small amount of space provided in the Home Blank in which to record facts about gifted relatives also limited the information secured. Home visits by the field assistants and correspondence have supplemented considerably the data supplied in the Home Blank, but our information on heredity is still extremely fragmentary.

Siblings in the Main Group

The 643 children discovered in the main search belong to 578 families. At the time the search was conducted 8 other children in these families qualified on the Terman Group Test for the high school gifted group. One qualified in the outside Binet group, and 5 were included because they came within five points of qualifying on the Binet. This brought the number to 657, or an average of 1.136 per family. Not counting the 5 cases with slightly below standard IQ, the total is 651, or an average of 1.126 per family. A year later 19 additional cases in these families qualified as a result of testing 48 sibs who had not been tested before. At present,

[1]Blanks for several additional families were secured after this summary was compiled.

therefore, the 578 families have furnished 676 subjects, or an average of 1.17 per family. There are at least 481 sibs (the number is growing) who have not been tested, and we estimate that among these are probably between 50 and 75 who are capable of reaching the standard set for the group. Below, will be found the number of families with one, two, three, four, or five children who qualified for the gifted group. Two sets of figures are given: A, those based upon the 658 children discovered in the original search (643 of main group and 15 others); and B, those which include in addition the 18 cases discovered by tests of sibs a year later.

	A	B
Families furnishing one gifted subject	511	497
" " two " subjects	62	73
" " three " "	2	4
" " four " "	3	4
" " five " "	1	1
	579	579

The cumulative figures are as follows:

	A	B
Families furnishing five gifted subjects	1	1
" " four or more	4	5
" " three or more	6	9
" " two or more	68	80
" " one or more	578	578

The number of families furnishing more than one subject would, of course, have been much smaller had no special effort been made to test sibs who had already qualified in the usual way as a result of the school search. We estimate, however, that even apart from this advantage, 578 families would have yielded approximately 600 subjects. Considering the highly selected nature of our group, the likelihood of a family furnishing two subjects by mere chance is very remote. Not more than one child in two hundred in the general school population is capable of satisfying the standard. The families represented in our group probably have on an average not more than two children attending the public schools. Reckoning the number in school as two, a given family would have one chance in a hundred of furnishing one subject. The likelihood of one family furnishing two subjects by chance alone would be $\frac{1}{100} \times \frac{1}{100}$, or one in ten thousand. Ac-

cordingly, by chance alone we should not have expected a single family to have yielded two subjects. Actually, 71 furnished two, and 80 two or more. Taking our estimate that 20 families would have done so even if no special search had been carried on among sibs, this would be 346 times the number which chance alone would have given. The record of 71 families with two children is, on the same basis of reckoning, 1,228 times as high as chance would give. Insofar as gifted sibs have been missed, this record is lower than it deserves to be. On the other hand it is possible that teachers in nominating children for the tests may have been inclined to favor the sib of a child who had made an exceptional school record. However, even if we make considerable allowance for this possibility, the showing made by these 578 families must still be considered remarkable.

Relatives in the Hall of Fame

Of the 62 members of the Hall of Fame, 14, or 22.58 per cent, are known to be related to one or more children of our main gifted group. At least one Hall of Fame relative was reported for 15 children, or 2.3 per cent of the group; and two or more for 7 children. The relationships are given in Table 17.

Table 17.

Relatives in the Hall of Fame

Name	Relationship	Child
1. John Adams	Direct line	E. A.
2. John Quincy Adams	Direct line	E. A.
3. Henry Ward Beecher	Not stated	J. W. S.
4. Samuel L. Clemens	"Distant cousin"	M. G.
" " "	"Third cousin"	L. K. R. K.
5. Charlotte Cushman	Not stated	R. N.
6. Benjamin Franklin	"Gt.-gt.-gt.-gt.-great uncle"	R. K. R. K.
7. U. S. Grant	"Third cousin, once removed"	P. R.
8. Elias Howe	Direct line	L. K. R. K.
9. Andrew Jackson	Not stated	Norma T.
10. H. W. Longfellow	Gt.-great-uncle	P. R.
11. Harriet Beecher Stowe	Not stated	J. W. S.

Name	Relationship	Child
12. George Washington	(In direct line from Alling and Mary Ball, grandparents of George Washington.)	R. E. M. E.
13. J. Geeenleaf Whittier	Not stated	A. M.
14. Roger Williams	Direct line	V. M.
	Direct line	R. N.
	Not stated	R. K. R. N.

Relatives in Who's Who

Twelve of the 643 are known to have a parent or grandparent in *Who's Who* (1921–22). These 12 children represent 8 families, which gives an average of 1.5 gifted children for such families. There are three fathers, two mothers, and four grandfathers in *Who's Who.* Two sibs have mother and grandfather thus distinguished. Each of the two mothers has two children in the group (all the living offspring). Of the three fathers, one has two children in the group. All the children of these three fathers who have been tested have qualified.

The above numbers are almost certainly too small, as it has not been possible to check all parents and grandparents against the numerous editions of *Who's Who.* It is also necessary to take into account the fact that half or more of these parents are still below the average age of first inclusion in *Who's Who.* Other parents of the group will doubtless yet attain this degree of distinction. The *Who's Who* group would have been much larger had the faculties of Stanford and the University of California been canvassed. Stanford does not enter at all in what we have called the "main search," and the University of California faculty was only partly canvassed. Of 128 old cases whom we have been following for several years, 12 are known to have a parent in *Who's Who.*

That three of the 578 fathers and two of the 578 mothers in our main group should have attained this distinction by mid-life is many times the number chance would give. Brimhall[1] finds the average age of first inclusion in *Who's Who*

[1]Dean R. Brimhall: Family Resemblances Among American Men of Science. *The American Naturalist,* 1923, p. 81.

(Vol. 6) to be 49.9 years. The average age of our 578 fathers is about 41 years, and that of our 578 mothers about 37 years. Brimhall estimates the chances of a man of the generality getting into *Who's Who* as one in 823.5. For men of the average age of the fathers of our gifted children the chances are probably less than one in 2,000. The actual number is three out of 578, which is about 10 times the number chance would give. In the case of women of the generality, Brimhall finds that the chances are only one in 7,647 of inclusion in *Who's Who*. Of 578 mothers of our gifted there are two of this distinction, which, considering their average age of 37 years, is many, many times the number chance would give. Brimhall found that the father of a distinguished man of science is 98 times as likely to be listed in *Who's Who* as is a man of the generality, and the brother of a distinguished man of science about 72 times as likely.

One of the fathers in *Who's Who* is also one of Cattell's 1,000 most distinguished men of science, one parent is a college president, and one grandfather is a widely known man of science. The names of distinguished parents and grandparents are withheld to avoid identification of any of our subjects.

Other relatives in *Who's Who* have been reported to the number of 35, which is probably below the actual. Four of these were first cousins of gifted children, two were aunts, and one an uncle. The entire list is given in Table 18.

TABLE 18.

RELATIVES IN WHO'S WHO

Name of Relative	Relationship to Gifted Child	Child
1. Abbott, James F. Prof. of Zoology, Washington Univ., 1904–17. Appointed commercial attaché to American Embassy in Tokio. Member of staff of American Delegation to conference on Limitation of Armaments, 1921.	Second cousin	H. G. J. G.
2. Bannard, Otto T. Banker.	Uncle	L. B.

Name of Relative	Relationship to Gifted Child	Child
3. Bradford, Edward G. Judge.	Great-uncle	W. E. B.
4. Clark, Champ Speaker of House.	Third cousin, once removed	J. D. F. D.
5. Day, Holman F. Author *Up in Maine*, etc.	Not stated	E. H.
6. Day, James R. Chancellor, Syracuse University. Author, *The Raid on Property*, etc.	Great-uncle	E. H.
7. Eaton, Amasa M. Lawyer.	Great-uncle	Rufus K. Roger K.
8. Einhorn, Max. Professor of Medicine, P. G. Hospital, New York. Inventor of instruments, author of medical books.	First cousin	V. R.
9. Elkus, Abram. Lawyer.	First cousin Also related to	R. E. M. L. K. L.
10. Fick, Arthur D. Author, *The Happy Princess*, etc.	Second cousin	M. M.
11. Gilbreth, Mrs. Lillian Psychologist.	First cousin, once removed	E. B.
12. Goldberg, Rube Cartoonist.	First cousin	M. F. I. F.
13. Harvey, G. B. M. Editor, New York World, 1891. Ambassador to England, etc.	Second cousin, once removed	E. V.
14. Hillis, Newell Dwight Writer.	Distant cousin	F. B.
15. Johnson, Hiram U. S. Senator.	Great-uncle	J. F.
16. Keller, Lue Alice Musician, lecturer, composer.	Aunt	M. E. K.
17. Lindley, Alfred Banker. Directed finances for 10 states in presidential campaign, 1920.	Not stated	G. K.

Name of Relative	Relationship to Gifted Child	Child
18. Lindley, Judge Curtis Lawyer.	Not stated	G. K.
19. Lindley, Harvey Capitalist.	Not stated	G. K.
20. Lindley, Walter Physician and author.	Not stated	G. K.
21. McCormick, S. B. Chancellor, Univ. of Pittsburgh.	Second cousin, once removed	J. McC.
22. Martin, Clarence	First cousin, once removed	L. G.
23. Michelson, Dr. Albert Professor of Physics, Univ. of Chicago.	Cousin	R. E.
24. Michelson, Miriam Dramatic critic and short story writer.	Second cousin	R. E.
25. Peck, John Hudson President, Renssalaer Inst.	Great-uncle	T. W.
26. Scarborough, Dorothy Writer. Instructor in English, Columbia University.	Second cousin, once removed	H. K.
27. Scarborough, George Playwright.	Second cousin, once removed	H. K.
28. Scarborough, L. R. Writer. President, Southwestern Theological Seminary.	Great-uncle	H. K.
29. Sproule, Wm. President, S. P. R. R. Company.	Second cousin	R. O.
30. Upshaw, W. D. Congressman from Georgia. Writer.	Second cousin	H. M.
31. White, Frank Ex-governor of North Dakota. United States Treasurer.	Second cousin	H. M.
32. White, Joseph Sanitarian.	Second cousin, twice removed	E. V.
33. Yeziersha, Anzie Author *Hungry Hearts*, etc.	Aunt	V. R.

Name of Relative	Relationship to Gifted Child	Child
34. Young, James Addison Supreme Court Justice.	First cousin, twice removed	K. K.
35. De Young, M. H. Founder of Golden Gate Museum.	Great-uncle	R. E.

Other Relatives of Distinction

There were 58 other relatives reported (in the Home Blank) of sufficient distinction to be named in standard cyclopedias of biography. These are listed below. Many relatives of perhaps equal distinction were excluded because no reference to them could be found in the biographical cyclopedias in the Stanford University Library. The list would probably have been considerably longer if foreign biographical cyclopedias had been more extensively consulted. Among the 58 are six signers of the Declaration of Independence, two presidents of the United States, two vice-presidents, four governors of states or colonies, four generals, six writers, two inventors, four statesmen, three artists, and two judges of supreme courts.

In Table 19 "Appleton" refers to Appleton's *Cyclopedia of American Biography,* and "National" to the *National Cyclopedia of American Biography.* In each case the relationship is given as reported in the Home Blank, and allowance must be made for ocasional inaccuracy, especially in the designation of cousin relationships and in the number of "great" prefixes. The latter suffix to a child's number indicates that the child has one or more sibs (indicated by another letter suffix) in the gifted group.

Table 19.

Other Relatives of Distinction

Name of Relative	Relationship to Gifted Child	Child or Children to whom related
1. Abbott, Lyman Clergyman and writer. Appleton.	Distant cousin	S. A. J. A. D. A. D. A.
2. Alden, John Colonial fame. National.	Direct line	A. M.

Name of Relative	Relationship to Gifted Child	Child or Children to whom related
3. Alexander, Abraham Statesman. Appleton.	Gt.-gt.-gt.-grandfather	J. M. M. M.
4. Allen, Ethan Colonial fame. National.	Direct line	L. K. R. K.
5. Anderson, Major Robt. Commander at Ft. Sumter. Appleton.	Third cousin	L. K. R. K.
6. Babbitt, Isaac Inventor of Babbitt metal. Appleton.	Gt.-gt.-uncle	G. B. M. B. B. B. M. B.
7. Barnum, P. T. Founder of Barnum's circus and writer. Appleton.	Not stated	W. B.
8. Bayrhoffer, Karl Philosopher, politi- cian and writer. Cassell's Biog. Dict.	Gt.-gt.-grandfather	H. T. O. T.
9. Bouguereau, Adolphe Painter; winner of premier grand prix de Rome. Siret's Dict. des Peintres.	Gt.-gt.-uncle	F. D. J. D.
10. Bradford, Governor William First governor of Massachusetts Bay Colony. Appleton.	Direct line	W. E. B.
11. Bradstreet, Anne Colonial fame. National.	Direct line	F. C.
12. Buchanan, James President of U. S. Appleton.	Gt.-gt.-gt.-grandfather	J. F.
	Distant cousin Not stated	R. H. D. C.
13. Buell, Gen. D. C. Civil War fame. Appleton.	Second cousin, once removed	G. M.
14. Carroll of Carrollton, Charles Signer of Declaration of Independence. Appleton.	Direct line	S. A. J. A. D. A. D. A.

Name of Relative	Relationship to Gifted Child	Child or Children to whom related
15. Cartwright, Rt. Hon. Sir Richard Canadian Statesman. Canadian Men and Women of the Time.	Grandfather	R. C. P. C.
16. Cornell, Ezra Founder of Cornell University. Appleton.	Third cousin, once removed	K. B.
17. Cushman, Robert Secured grant for Plymouth Colony. Appleton.	Direct line	R. N.
18. Dodge, Mary Mapes Writer of children's stories and poems. Lippincott's Bio. Dict.	Maternal aunt	M. G. S. G.
19. Fairbanks, Charles Vice-president of U. S. National.	Direct line	B. D.
20. Gerry, Elbridge Signer of Declaration and Vice-president of U. S. Appleton.	Direct line	S. A. J. A. D. A. D. A.
21. Harrison, William Henry President of U. S. National.	Gt.-gt.-uncle	R. B.
22. Healy, James Roman Catholic Archbishop; humorist. Dict., Universal Biog.	Second cousin	M. K.
23. Heyward, Thomas Signer of Declaration. Appleton.	Not stated	W. E. B.
24. Hillier, Sir Walter K.C.M.G. and C.B. Author and inventor. Appleton.	Grandfather	R. H.
25. Hooker, Thomas First Governor, Connecticut Colony. Appleton.	Direct line	F. F.
26. Hopkins, Stephen Signer of Declaration. Appleton.	Gt.-gt.-gt.-uncle	A. McM.

Name of Relative	Relationship to Gifted Child	Child or Children to whom related
27. Johnston, Gen. Joseph E. General in Civil War. National.	Second cousin	C. M.
28. Kingsley, Charles Writer. National.	Not stated	R. B.
29. Lee, Henry Light-horse Harry of Revolution. Appleton.	Not stated	D. D.
30. Lee, Richard Henry Signer of Declaration. (Note: Henry Lee was a nephew of Richard Henry Lee. Robert E. Lee comes from the same family.) Appleton.	Direct line	T. C.
31. Lewis, Francis Signer of Declaration. Appleton.	Direct line	J. I.
32. Lewis, Morgan Captain in Washington's army, and governor of New York. National.	Gt.-gt.-gt.-uncle	J. I.
33. McCreery, John Poet. Appleton.	Gt.-gt.-grandfather	E. M.
34. Mapes, James Chemist, lecturer, editor and publisher. Appleton.	Gt.-grandfather	S. G. M. G.
35. Maxwell, Augustus Lawyer, railroad president, etc. Congressional Directory.	Gt.-gt.-uncle	C. M.
36. Medley, Samuel Poet and divine of very distinguished ancestry. National.	Gt.-gt.-grandfather	E. L.
37. Morgan, Daniel Hero of Revolution. Appleton.	Direct line	C. C.

Name of Relative	Relationship to Gifted Child	Child or Children to whom related
38. Mott, Lucretia Quakeress preacher and advocate of women's rights. Notable Women of History.	Not stated	H. H.
39. Nevin, Robert Rector of St. Paul's Am. Church, Rome. Appleton.	Gt.-grandfather	K. M.
40. Opie, John Portrait painter. Member Royal Academy. National.	Not stated	D. C.
41. Orr, James L. Statesman. Appleton.	Not stated	D. M.
42. Osbourne, Frederick Canadian lecturer. Canadian Men and Women of the Time.	Not stated	E. B.
43. Paroni, Giovanni Theologian and writer. Encyc. Brit.	Not stated	E. A.
44. Patterson, Robert E. Governor of Pennsylvania. Appleton.	Not stated	C. McC.
45. Perkins, Samuel Elliott Judge of Supreme Court, Indiana, and Professor of Law. Appleton.	Not stated	J. A. M. A.
46. Pierson, Abraham First head of Yale. National.	Not stated	R. K. R. K.
47. Prentice, George D. Poet and editor. Founded Louisville Journal. Appleton.	Gt.-gt.-gt.-grandfather	P. S.
48. Rolfe, John and Pocahontas Colonial fame. Appleton.	Not stated	J. D. F. D.
	Direct line	I. C.
49. Scott, Winfield General in Mexican War. Appleton.	Not stated	V. McI.

Name of Relative	Relationship to Gifted Child	Child or Children to whom related
50. Sewall, Samuel Appleton.	Direct line	R. K. R. K.
51. Snow, Lorenzo President of Mormon Church (1898). Ency. Brit.	Gt.-grandfather	M. McA.
52. Stanton, Edwin M. Statesman. Appleton.	Gt.-gt.-uncle	E. W.
53. Trumbull, Jonathan Statesman. Appleton	Direct line	J. A. M. A.
54. Ward, Genevieve	Distant cousin	E. McM. E. McM.
55. West, Benjamin Artist. Member of Royal Academy. Champlin's Cycl. of Art and Artists.	Direct line	F. P.
56. Wilson, Thomas Judge, Supreme Court; Senator from Minnesota. Appleton.	Second cousin	C. C. E. C.
57. Winthrop, John Colonial fame. Appleton.	Direct line	S. A. J. A. D. A. D. A.

Positions of Honor, Trust, or Responsibility Held by Parents and Grandparents

The data summarized in Table 20 are from the Home Blanks which had been returned by 528 of the 578 families in the main gifted group at the time of tabulation. The list is known to be very incomplete, due to the frequent failure of parents to report honors of considerable importance. The positions of honor reported have been summarized under the headings political, religious or fraternal, professional or academic, business or financial, and miscellaneous. In many cases two or more positions of honor were named for the same parent or grandparent. Unfortunately, at the time the tabulations were made, duplicate positions of honor were not separately recorded; accordingly, the totals for each group refer to total number of honors, and not to number of parents or grandparents who have attained such honors. It is

evident, however, that the proportion of gifted ancestors in this group of 528 families is extraordinarily high in comparison with the generality.

TABLE 20.

POSITIONS OF HONOR, TRUST, OR RESPONSIBILITY HELD BY PARENTS AND GRANDPARENTS

	Father	Mother	Grand-father	Grand-mother	Total
A. Political:					
1. Major national government offices, as senator, representative, etc.	11	0	9	0	20
2. Major state offices as above	8	0	17	1	26
3. Mayor of city of 25,000 or more	2	0	2	0	4
4. Mayor of city or town, less than 25,000	1	0	11	0	12
5. Important civic offices other than mayor	10	1	26	0	37
6. Minor political offices	32	18	93	2	145
Total, Group A	64	19	158	3	244
B. Religious or fraternal orders:					
1. Pres. or vice-pres. state or large city branch of orders, such as DAR, KC, etc.	14	2	13	10	39
2. Important church offices, (bishop, etc., over large areas)	8	5	15	0	28
3. Miscellaneous club offices	105	94	73	64	336
4. Miscellaneous church offices	68	53	90	35	246
5. Class offices in college	19	15	0	0	34
Total, Group B	214	169	191	109	683
C. Professional or academic:					
1. College president	0	2	2	0	4
2. College trustee	1	0	9	0	10
3. Teacher in college	13	4	4	2	23
4. School principal or superintendent	4	3	5	1	13
5. Miscellaneous professional honors	55	16	19	0	90
Total, Group C	73	25	39	3	140

	Father	Mother	Grand-father	Grand-mother	Total
D. Business or financial:					
1. Supt. or manager of large factory or corporation	46	0	28	0	74
2. Bank president	4	0	14	0	18
3. Bank director or trustee	1	0	4	1	6
Total, Group D	51	0	46	1	98
E. Miscellaneous:					
1. Commissioned officer, army or navy	17	0	27	0	44
2. Public speaker of note	0	0	0	1	1
Total, Group E	17	0	27	1	45

Incomplete List of Distinguished Relatives of Three Gifted Sibs

We have not thus far been able to undertake the completion of any genealogies of our gifted families, although considerable material has been assembled for several. With some hesitation, owing to the incompleteness of our information, the available data are presented for one family. This family is doubtless above the average of our group, both as to number of distinguished relatives and as to completeness of family records; nevertheless, there are many other families in the group, which, judging from such information as we have, would make almost or quite as good a showing.

Most of the information regarding this family was obtained by Miss Goodenough from written or printed records, including genealogies, D.A.R. records and Appleton's *Cyclopedia of American Biography*. On the Home Blank only seven distinguished relatives were mentioned. Follow-up of the case brought to light 34 relatives sufficiently distinguished to be named in Appleton's *Cyclopedia of American Biography* or in *Who's Who*, besides many others somewhat less distinguished. Of course, a majority of these relatives are too remote to be of much significance, individually, in the biological make-up of the propositi, but the significant fact is the frequency with which gifted relatives appear. The family shows a high order of selective mating throughout. In the following (incomplete) list of distinguished relatives those designated by a star are named in Appleton's *Cyclo-*

pedia or *Who's Who*. The names are grouped according to the generation to which they belong, counting back from the propositi. In order to preserve the anonymity of the immediate family, all names in the direct line are omitted in the first three generations.

TABLE 21.

SUPERIOR RELATIVES OF A GIFTED FAMILY

Zero generation.

Propositi: IQ 183; IQ 140; IQ 131, sibs.

First generation.

1. Father. Graduate of Stanford and of Harvard Law School. Very successful attorney.
2. Father's brother. Bond buyer.
3. Mother. Amateur artist of some ability.
4. Mother's brother. Inventor.
5. Mother's brother. Mining engineer.

Second generation.

6. Paternal grandmother. Speaks "several" languages.
*7. Maternal grandfather. Artist and collector.
*8. Brother of 7. Lawyer.
*9. Joseph Bartine. Remote cousin of paternal grandfather. Naval officer, commander of Philadelphia Navy Yard, Inspector of Lighthouses, and President of Naval Examining Board.

Third generation.

*10. Paternal great-grandfather. Author of several religious books and many poems.
11. Paternal great-grandfather. Wall street financier.
*12. Rufus King. Remote cousin of paternal great-grandfather. Graduate of Bowdoin. Writer on religious and historical subjects.
*13. John Smith. Cousin of 12. Professor rhetoric and English literature at Bowdoin.
*14. Isaac Hull. Remote cousin of direct ancestor. Naval officer and commander of the Constitution.
*15. John Carter Brown II. Second cousin of direct ancestor. Merchant, philanthropist, and bibliophile. Gave $160,000 to erect a university library.

Fourth generation.

*16. Samuel Sewall IV. Cousin of direct ancestor. Clergyman and writer of local histories.
*17. Nicholas Brown II. Cousin of direct ancestor. Member of Rhode Island legislature and one of leading patrons of Rhode Island College, the name of which was changed to Brown University in his honor. Founder of many worthy charities, including a hospital for the insane at Providence.

* In Appleton's *Cyclopedia* or *Who's Who*.

*18. Obadiah Brown. Cousin of direct ancestor. Merchant, manufacturer, and philanthropist. One of the firm of Almy, Brown and Slater, which first introduced cotton spinning into this country. Left endowment of $100,000 to the Friends Boarding School founded by his father.

*19. William Hull. Remote cousin of direct ancestor. Graduate of Yale. Major in Washington's army. Personally honored by Washington for his services at Stony Point. General in War of 1812.

Fifth generation.

*20. Samuel Sewall III. Brother of direct ancestor. Chief justice of Massachusetts supreme court. Member of Congress for two terms.

*21. Thomas Sewall. Remote cousin of 16. Physician. Author of *Pathology of Drunkenness,* etc.

*22. Jotham Sewall. Remote cousin of 16. Evangelist.

*23. John Brown II. Direct ancestor. One of "Four Brothers Brown." Wealthy merchant and trader. His ships went to all parts of the world. Member of Congress, 1799. One of the chief patrons of Rhode Island College.

*24. Nicholas Brown. Brother of 19. Merchant and philanthropist. Patron of Rhode Island College.

*29. Joseph Brown. Brother of 19. Scientist and inventor, especially interested in electricity and astronomy. Held chair of natural philosophy in Rhode Island College, serving without compensation.

*26. Moses Brown. Brother of 19. Founded the Friends Boarding School in Providence. Philanthropist and leader in Society of Friends of Rhode Island.

Sixth generation.

*27. Stephen Sewall I. Second cousin of direct ancestor. Hebrew scholar. Prolific writer and translator.

*28. Samuel Sewall V. Brother of 23. Inventor. First to drive piles as foundation for bridges.

*29. David Sewall. Brother of 23. Justice of superior court, and member of Massachusetts council.

*30. Jonathan Sewall. Second cousin of direct ancestor. Lawyer, orator, writer.

*31. Jonathan Mitchell. Second cousin of direct ancestor. Poet.

32. Edmond Kimball. Direct ancestor. Collector of taxes under King's Commission in colonial Massachusetts.

33. Asa Buel. Direct ancestor. Captain in Continental Army. Member of Connecticut State Legislature in 1802. His niece, Mrs. Sara Josepha Hale, was editor of Godey's *Lady's Book.*

*34. James Brown II. Direct ancestor. Leading merchant in Providence and father of the "Four Brothers Brown."

Seventh generation.

*35. Stephen Sewall I. Cousin of direct ancestor. Judge of Supreme Court of Massachusetts.

*36. Joseph Sewall. Direct ancestor. Son of Samuel Sewall. Elected president of Harvard in 1724 but declined.

37. Samuel Kimball. Direct ancestor. First overseer Merrimack, afterward Bradford, Massachusetts. Held the rank of a cornet of a troop of horse.

*38. James Brown I. Direct ancestor. Pastor of Baptist Church in Providence and leader in the colony.

Eighth generation.

*39. Samuel Sewall I. Direct ancestor. Famous judge in Salem witchcraft trials. (The only one of the judges who later publicly admitted his error.) Entered Harvard at 15.

40. Abraham Pierson III. Direct ancestor. Known as the "Worshipful." Magistrate for fifty years in Clinton, Connecticut.

*41. John Brown I. Direct ancestor. Member of town council of Providence. Leader in colonial affairs.

Ninth generation.

*42. John Hull. Direct ancestor. Goldsmith. Mintmaster and treasurer of Massachusetts colony.

43. Richard Hull. Brother of 37. Man of importance in Massachusetts colony.

44. Richard Kimball. Direct ancestor. Puritan. Came over in the "Elizabeth" 1634.

45. Samuel Buell. Direct ancestor. One of the original settlers in Killingworth, Connecticut. Owned estate of 1000 acres. Was styled "gentleman." Commissioner of the Peace for several years.

*46. Abraham Pierson II. Direct ancestor. First president and one of ten founders of Yale.

*47. Chad Brown. Direct ancestor. One of the founders of Rhode Island Colony. Succeeded Roger Williams as leader. Was called "The Peacemaker."

Tenth generation.

48. William Buell. Direct ancestor. Emigrated from England in 1630. One of the original settlers in Windsor, Connecticut, which he assisted in laying out.

*49. Abraham Pierson. Direct ancestor. Graduated from Cambridge. Emigrated to America in 1639. Pastor of Boston Church. Author of several religious books, *Help for Indians,* etc.

Other distinguished relatives of this same propositi include Roger Williams, Ezekiel Howe, and Benjamin Franklin, but we do not have the data regarding exact relationships.

The A—— Family

The A—— family is the result of a Japanese-American marriage. There are five children, all but one of whom have qualified for our gifted group. That one is still too young to test.

Girl — age 12 — eighth grade—IQ 137
Boy — age 11 — eighth grade—IQ 150
Girl — age 9 — fifth grade — IQ 140
Boy — age 7 — second grade—IQ 147
Girl — age 1 — has not been tested.

This is indeed a remarkable family, and the fact that it is the result of a mixed marriage makes it doubly interesting. This was the first, or one of the first, Japanese-American marriages in America and it aroused much unfavorable comment at the time. The parents were married in Portland, Oregon, because of the difficulty of finding any one in California who would consent to perform the ceremony. Following are a few facts regarding the heredity of the children.

Paternal. The father of the propositi was born in Japan. He had four years of high school education, later studied silk culture, and before coming to America lectured on this and other subjects. In this country he has followed several occupations, but is now a florist and nurseryman. His father was born in Japan, of Japanese parents, and was educated by a private tutor. He was a fencing master and producer of silkworm eggs. He was very fond of reading, was a good chess player, and was twice elected Ko-cho, or head of the town. Little is known of the paternal grandmother of the children except that she was born in Japan, of Japanese parents, and that she was educated by a private tutor.

Maternal. The mother was born in California and comes of exceptionally superior colonial ancestry. She attended college one year. She has held important offices in local churches and clubs and has published several poems and essays in newspapers and magazines. Her mother was born in California, had a high school education, is prominent in church and club circles, and lectures on home economics. She is descended from Charles Carroll of Carrollton, a "signer," and is related to Lyman Abbott. The maternal grandfather of the propositi was born in Massachusetts. He

is a prominent man and has held many church offices of more than local importance. After the San Francisco earthquake and fire he was an outstanding figure in the work of rehabilitation. In the direct line of his ancestry are six colonial governors (including John Winthrop and William Bradford), and Elbridge Gerry, a "signer" and the fifth vice-president of the United States. There are also in the ancestry of the propositi several writers, artists, judges, clergymen, and government officials.

We have another mixed Japanese-American family represented in our group by a child of IQ 153. As in the A—— family, it is the father who is of Japanese descent. Each of the parents comes of rather superior stock. Still another child of Japanese-American parents is included in our special group showing artistic ability. In this case the mother is Japanese. In our outside Binet group, there is a child of 149 IQ of mixed Chinese-American parentage (father Chinese). All of these mixed marriages would have to be regarded, from a biological point of view, as highly successful. They illustrate the fact that in determining the quality of the offspring the racial factor is much less important than the influence of near ancestors.

The R—— Family

This is a Roumanian-Jewish family of eight children, three of whom belong to our gifted group: twin girls—age eight—fourth grade—IQ's 142 and 131, and a girl—age ten —seventh grade—IQ 139. A brother, IQ of 123 at age of fourteen, will complete high school at fifteen. He has been an honor student throughout his high school course and has exceptional musical talent. He has played the clarinet several times for the *Los Angeles Examiner* Radio Broadcasting Company and has composed orchestral pieces. His ten year old sister is also musical and sometimes accompanies him in broadcasting. The school records of the other children in this family are all very superior.

The parents came to America at about the age of twenty, practically penniless. The father worked at odd jobs and the mother in a factory. Neither parent had had more than a few months of schooling in Roumania. After coming to America the father attended night school, which the mother

was unable to do because of the children. When the oldest child began to attend school, the parents had him bring home his books in order that they might study with him of evenings. They have continued to educate themselves, now read and write English well, and are unusually well informed on most subjects of general interest. The mother, especially, has read a great deal along lines of child training and child welfare and shows remarkably good judgment in putting theory into practice.

The family is still in very moderate financial circumstances. The father worked in a butcher shop for several years, but failing health recently made it necessary for him to find lighter work. They accordingly rented a tiny shop next to their home (which is in a foreign neighborhood near the outskirts of the city) and have opened a small general store which the mother helps to look after. Their home contains only the barest necessities, as far as furnishings are concerned, but there is a piano and also a small library of well chosen books, including the *Book of Knowledge*. Both parents appear to have decidedly superior intellectual ability. Certainly their opportunities have been no better than those of thousands of foreigners with stupid children whose inferior intellectual ability is so commonly ascribed to lack of educational advantages.

The B—— Family

In the B—— family are four girls, all in the gifted group. One is a fifteen year old girl with a Terman Group Test score of 191. She is an "A" student in all her work and plays the cello and piano.

The second is thirteen and has a Binet IQ of 137. She leads her class in the first year of high school and plays the cornet in the high school orchestra.

The third is eleven years old and in the eighth grade. Her Binet IQ is 152. She plays the violin in the Los Angeles Children's Orchestra. Music teachers and musicians who have heard her play regard her as highly gifted musically.

The fourth is nine years old and is in the sixth grade. Her IQ is 172. She learned to read at the age of four without instruction. She plays the flute and was admitted to the Los Angeles Children's Orchestra after six months of instruction.

The father of these children was manager of a sugar of milk factory and invented machinery for use in the factory, but he developed manic-depressive insanity at the age of 53 and has since been confined in a sanitarium. The mother owns and manages a real estate office and supports the family. She had three years in college. The paternal grandfather was a teacher, of Scotch and French descent. The paternal grandmother, also of Scotch and French descent, was a woman of very superior intelligence, but was mentally unbalanced for a period of two years at the time of the menopause. The maternal grandfather was entirely self-educated but was a great reader and especially fond of Emerson and Carlyle. The maternal grandmother seems to have been appreciably above the average in intelligence.

It is interesting that the four children of this family should combine exceptional musical ability with such marked intellectual superiority; also that the ancestry during the two preceding generations gave no evidence of very exceptional musical talent. However, the mother plays the piano and is well informed along musical lines.

Summary

1. The 578 families of the main group have yielded 676 subjects, although nearly 500 of their sibs have not been tested. Seventy-three families have yielded two subjects, and nine three or more. The number of families with two subjects is more than 1,200 times the number chance would give.

2. Nearly a quarter of the members of the Hall of Fame are known to be related to one or more of our subjects. The number in our main group known to be so related is 15, or 2.3 per cent of the entire number.

3. Although a majority of the parents are relatively young, five are listed in *Who's Who,* three fathers and two mothers. This is many times the number chance would give. Four grandfathers and 35 other relatives are known to appear in *Who's Who.*

4. Among 58 other eminent relatives are six signers of the Declaration of Independence, two presidents and two vice-presidents of the United States, four generals, six writers, two inventors, four statesmen, three artists, and two supreme court judges.

5. Parents and grandparents have held posts of responsibility in very great number, including 20 cases of major national office, 26 of major state office, 67 of major religious or fraternal office, 4 college presidencies, 23 professorships in colleges, 74 positions as superintendent or manager of a large factory or corporation, and 18 bank presidencies.

6. There is one family in the group which has 34 known relatives sufficiently distinguished to be named in Appleton's *Cyclopedia of American Biography* or in *Who's Who,* besides many others somewhat less distinguished. The indications are that many other families in the group have genealogies hardly less interesting. One of these is a family of five children (four of them in the gifted group), who are the offspring of a Japanese-American marriage.

The data set forth in this chapter are very incomplete, but fragmentary as they are, they give considerable support to Galton's theory as to the hereditary nature of genius. Unfortunately, it has thus far not been possible to carry out any studies of a kind which would give exact data on family resemblances in the group or reveal the laws by which superior mental ability is transmitted.

CHAPTER VI

VITAL STATISTICS

Size of Families

Reliable information on the relative fecundity in families with gifted offspring and in families of the generality would be extremely valuable. Such comparisons, however, present many difficulties. Our own data are inadequate in two respects. In the first place, owing to the age of the parents of our gifted group, there are only 92 of our families which may safely be reckoned as completed. In the second place, even if all were completed, a direct comparison with the fertility of parents in the generality is rendered difficult by reason of the fact that no family without at least one child could get into our group. Our group of parents is in this respect selected. Marriages in this group would need to be compared, not with marriages in the population at large, but with fertile marriages of the general population. Obviously, the average number of offspring resulting from fertile marriages is greater than the average number for all marriages. Notwithstanding the lack of strictly comparable data, the following facts are of interest.

The 92 mothers of the completed[1] families for whom we have medical records report a total of 354 pregnancies, or an average of 3.84 each. (Since two of these were twin pregnancies, the number of children which might have resulted is 356.) Forty-six miscarriages and 45 deaths (25 boys, 20 girls) were reported. The 308 births (exclusive of miscarriages) give an average of 3.35 per family. In the 308 living births there were 164 boys and 144 girls, which gives a sex ratio of 113.9 boys to 100 girls.

Cattell found that the average number of children born to 440 American men of science who had married and whose families were completed was 2.3, and for those born in cities,

[1]Families were counted as completed when the mother was 45 years old or older.

2.15.[1] This is considerably lower than for our 92 families, but it should be noted that Cattell's group includes barren marriages, while our group does not. Galton[2] found that a group of 100 English men of science, excluding barren marriages, had on an average 4.7 children. This is twice the number for present-day American men of science, and far above that found for our group. Havelock Ellis found an average of 5.45 children for 214 fertile marriages of British men of distinction, which is nearly twice that found for our group.[3] As Galton and Ellis both excluded barren marriages, their figures are comparable with our own and indicate that the fertility of families producing superior offspring is probably much less today than it was a half century or a century ago. The birth rate of the general population has also decreased, but probably less than that of superior stocks.

Information on the decreasing fertility of superior stocks is furnished by a comparison of the average number of children in our 92 completed families with the average number in the families from which these 92 pairs of parents come. The latter was found to be 5.33 for the fathers' families, 5.66 for the mothers' families, and 5.50 for both. The comparison, however, is not between 5.50 and 3.35, as Galton and Ellis assumed in their calculations. Cattell has pointed out that in any population whose families remain of the same average size in successive generations, every one is likely to come from a larger family than he has. "If, for example, all families were of one or of seven children equally divided, the average family would be four in each generation, but the children would be seven times as likely to come from the larger family and would belong to a family which, on the average, would be 6.25."[4] The families from which our 92 pairs of parents come had an average of 5.50 children. According to Cattell, with an average family of three in the general population, the size of 100 families would be distributed approximately as follows:

Size of family	0	1	2	3	4	5	6	7	8	9	10
No. of families	18	10	20	23	15	7	5	3	2	1	1

[1] *American Men of Science*, New York, 1921, p. 793.
[2] *English Men of Science*, London, 1874; New York, 1875.
[3] *A Study of British Genius*, London, 1904, p. 793 ff.
[4] *American Men of Science*, p. 794.

The average size of the family from which each of the 300 children comes is reckoned as follows:

(1) Size of Family	(2) No. of Families	(3) No. of Children	(4) Column 1 x Column 3 to get weighted average.
0	18	0	0
1	10	10	10
2	20	40	80
3	23	69	207
4	15	60	240
5	7	35	175
6	5	30	180
7	3	21	147
8	2	16	128
9	1	9	81
10	1	10	100
Total	105	300	1348

1348 ÷ 300 = 4.49, which is the average size of the family from which each child comes, in this hypothetical case. As the children of our 92 completed families come from families of the average size of 5.50, the families of the class to which they belong were of the average size of 3.67.

$$\frac{3 \times 5.50}{4.49} = 3.67$$

The conclusion is that the fertility of the stock represented by these completed families has decreased in one generation from 3.67 to 3.35. It is doubtful whether this is a greater decrease than would be found for the general population.

The data for 91 of the 92 completed families represented in the Home Information Blanks are are follows:

	Number of Children (Total Births)									
	1	2	3	4	5	6	7	8	9	10
Present Generation	19	22	16	11	7	7	3	2	2	–
Father's Family	7	8	12	12	10	9	10	7	3	3
Mother's Family	1	8	12	12	11	14	12	5	5	1

	11	12	13	14	15	16	17	18	19
Present Generation	2	–	–	–	–	–	–	–	–
Father's Family	–	1	–	2	–	–	–	–	1
Mother's Family	5	2	–	–	–	–	–	–	–

The above figures give the size of only 85 of the fathers'

families, and 88 of the mothers', as the information was in a few cases omitted. The correlation between number of children in the present generation and number of children in each of the parents' families was as follows:

Immediate family vs. father's family, $r = +.36 \pm .06$.
Immediate family vs. mother's family, $r = +.18 \pm .07$.

Size of Family and Education of Parents

An attempt was made to find out whether within this group of 92 families there was any correlation between the amount of schooling of parents and the number of offspring. The highest school grade reached was used as the measure of schooling, and a schooling index for mid-parent was calculated by averaging the highest grade reached by the two parents. For example, one parent reached Grade 12 and the other, Grade 8, the mid-parent index of schooling was 10. The correlation with number of offspring as shown in Table 22, is $-.214 \pm .07$.

Table 22.

Schooling of Parents and Number of Living Births

Mid-Parent Schooling	Number of Living Births										
	1	2	3	4	5	6	7	8	9	10	Total
Less than 7 grades	–	–	1	1	–	1	–	–	–	1	4
7 "	2	2	–	–	2	–	–	–	–	–	6
8 "	3	3	–	2	–	3	2	2	–	–	15
9 "	1	1	2	2	1	3	–	–	–	–	10
10 "	1	4	1	2	2	–	–	–	–	–	10
11 "	1	2	–	1	2	–	–	–	–	–	6
12 "	3	6	3	1	1	–	1	–	–	–	15
13 "	–	3	2	1	–	–	–	–	–	–	6
14 "	–	1	2	2	1	–	1	–	–	–	7
15 "	–	1	2	–	2	–	–	–	–	–	5
16 " or more	–	–	2	4	2	–	–	–	–	–	8
Total	11	23	15	16	13	7	4	2	–	1	92

$r = -.214 \pm .07$

Note. Here, 7 grades means 7 but not 8; 8 means 8 but not 9, etc.

Size of Family and Degree of Superiority of Children

Another question that arises is whether there is any correlation, within our highly selected group, between the degree of a child's superiority and the size of family from which he comes. The correlation was computed for the 92 completed families and found to be —.271±.062.

Table 23.

IQ and Size of Family

Corrected IQ of Child	Number of Living Births in Family									
	1	2	3	4	5	6	7	8	9	10
200	—	—	—	—	—	—	—	—	—	—
190	—	—	—	—	—	—	—	—	—	—
180	1	1	—	1	—	—	—	—	—	—
170	—	2	2	—	—	—	—	—	—	—
160	1	2	4	1	—	—	—	1	—	—
150	4	12	4	4	1	2	—	—	—	—
140	7	14	8	5	5	7	3	1	1	1
130	—	2	1	—	—	—	—	—	—	2
Total	13	33	19	11	6	9	3	2	1	3

$r = -.271 \pm .062$

The above correlation is high enough to be decidedly significant, from the point of view of eugenics, and it is desirable to know whether it can be accounted for on the hypothesis that the most gifted parents (those most likely to have children of highest IQ) are prevented from having large families by their greater educational ambitions. It is possible to answer this question by the method of partial correlations. The correlation between IQ of child and schooling of mid-parent was found to be +.16. The correlation between IQ of child and number of living births, with schooling of mid-parent constant, is –.246±.063. That is, the fact that the highest IQ's are found in the smallest families can not be accounted for by the supposed interference of schooling, as it is but slightly reduced when the effect of this factor is eliminated.

Miscarriages

In the 92 completed families, 46 miscarriages were reported by the mothers to our examining physicians. The proportion of pregnancies which resulted in miscarriages, 7.7 per cent, is very low. For 10,043 pregnancies, records of

which were obtained in a hospital of Manchester, England, Dr. A. S. Parker[1] reports 1,659 abortions (miscarriages), or a proportion of 16.5 per cent. The proportion was very small in the younger mothers and rose to 20.7 per cent by the age of 28. Of mothers of gifted children, 57, or 62 per cent of the 92, report no miscarriages, and in five cases the question is not answered. (In one of these the mother is dead. No reason for failure to reply in the other four cases is known.) The physicians asked in each case of miscarriage whether it was induced or spontaneous. It can be assumed that whenever the information given by parents on this point is incorrect, the error is pretty certainly in one direction, as there is little likelihood of a mother reporting a miscarriage as induced which was spontaneous. There are 23 who report spontaneous miscarriages only; one, induced miscarriages only; three, both induced and spontaneous; and three fail to state whether the miscarriage was induced or spontaneous. The number of induced miscarriages admitted is nine. The following figures give the number and kind of miscarriages for each mother:

	Number per mother.				
	1	2	3	4	Total
Mothers having spontaneous miscarriages	19	3	2		31
Mothers having induced miscarriages	2		1	1*	9
Kind not stated	1	1	1		6
Total miscarriages	22	8	12	4	46

* One mother reported four induced miscarriages and one that was spontaneous, which gives one case of five miscarriages in the row of totals.

If the chances of superior endowment were the same for these 46 aborted offspring as for their sibs, a considerable number of potentially gifted individuals have thus been lost to the world. In all probability some of these were lost through abortions which were induced. The total number of potentially gifted individuals thus sacrificed in a nation of a hundred million population must be very large, even when due allowance is made for the small proportion of gifted offspring in the population at large. Probably a number of these mothers attempted miscarriages which they did not succeed in bringing about. One such failure is known to have given us one of our brightest and most promising boys.

[1] *Eugenics Review*, Vol. 15, 1924, p. 584 ff.

Infant Mortality in Families of Gifted

The infant mortality in families of gifted children has been compared with that in the general population with respect to per cent of deaths under one year and under five years. This comparison has been made separately for the 91 completed families for whom we have Home Blanks. The results given below show that infant mortality in our gifted families is about two-thirds of the expected in the case of boys, and only one-third of the expected in the case of girls. The good showing might indicate either better care, better heredity, or both.

	Percentage of Mortality			
	Under 1 year		Under 5 years	
	Males	Females	Males	Females
General Population	12.32%	10.23%	17.03%	14.65%
91 Completed Families of Gifted	8.8 %	3.4 %	11.9 %	5.5 %

Age of Parents at Birth of Gifted Child

This question was asked in the Home Information Blank and was answered for 583 children, or 96.5 per cent of those for whom the blank was filled out. Accordingly, the data as shown in Table 24 may be considered representative. In this case there would seem to be no important selective factor which would give an abnormally large number of children whose parents were especially old or especially young at the birth of their gifted offspring. Perhaps one selective factor does enter to a slight degree. Such would be the case, for example, in a population containing an abnormally large or an abnormally small proportion of young married couples. This proportion is likely to be rather large in frontier communities, but in cities such as we are here concerned with this factor would probably be small, even though they have had a fairly heavy immigration in recent years from other states.

Cattell found the average age of fathers of 865 leading American men of science to be 35 years at the birth of their sons, and that of the mothers 29 years and 8 months. These figures agree very closely with those in Table 24. The average age of fathers of 299 British men of genius was found by Ellis to be 37.1. The corresponding figure for fathers of 100 English men of science studied by Galton was 36;

TABLE 24.

AGE OF PARENTS AT BIRTH OF GIFTED CHILDREN

Age	Boys' Parents No. Cases		Girls' Parents No. Cases		Total Both Sexes No. Cases	
	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers
15–19	1	10	0	5	1	15
20–24	27	70	29	61	56	131
25–29	76	119	65	90	141	209
30–34	105	80	71	63	176	143
35–39	59	31	52	30	111	61
40–44	33	9	24	15	57	24
45–49	6		14		20	
50–54	3		7		10	
55–59	5		0		5	
60–64	3		1		4	
65–69	1		1		2	
Total	319	319	264	264	583	583
Mean	33.63 yrs.	28.74 yrs.	33.64 yrs.	29.34 yrs.	33.63 yrs.	29.01 yrs.
Median	32.64 yrs.	28.35 yrs.	32.68 yrs.	28.65 yrs.	32.66 yrs.	28.48 yrs.
S. D.	7.68 yrs.	5.56 yrs.	7.78 yrs.	5.87 yrs.	7.70 yrs.	5.64 yrs.

for the mothers of this same group, 30. Ellis thinks there is a positive correlation between degree of eminence and age of father, but his data do not at all warrant this conclusion. The corresponding figure for the entire population would doubtless be much lower than for any distinguished group, but the difference is probably accounted for entirely by age of marriage, voluntary limitation of births, and other factors having no biological basis.

Table 24 shows that the average age of fathers is 4.62 years in excess of the average age of mothers. The difference for parents of gifted boys is 4.89 years, and for parents of gifted girls, 4.30 years. The difference between medians is 4.29 for parents of boys, 4.03 for parents of girls, and 4.18 for both. The difference between the excess of father's age over mother's for the gifted boy group as compared with the gifted girl group is well within the range of chance. The direction and extent of disparity in age of parents is shown in Table 25.

Statistics on the age of marriage of these parents would be interesting, but unfortunately this item was omitted by oversight from the Home Information Blank.

TABLE 25.

DISPARITY IN AGES OF PARENTS

(Minus sign indicates the father was younger than the mother)

Years	Boys' Parents No. Cases	Girls' Parents No. Cases	Total Both Sexes No. Cases
—10 and 9	1	0	1
—8 and 7	0	2	2
—6 and 5	6	3	9
—4 and 3	7	7	14
—2 and 1	19	25	44
0	31	24	55
1 and 2	56	48	104
3 and 4	63	51	114
5 and 6	47	31	78
7 and 8	29	22	51
9 and 10	24	18	42
11 and 12	11	16	27
13 and 14	7	7	14
15 and 16	5	3	8
17 and 18	3	0	3
19 and 20	3	1	4
21 and 22	2	4	6
23 and 24	1	1	2
25 and 26	2	1	3
27 and 28	2	0	2
Total	319	264	583

ORDER OF BIRTH

Owing to the form of our data it is impossible to work out the birth order exclusive of miscarriages, since the order of miscarriage is not stated and the order of birth of the propositi as stated includes miscarriages and deceased siblings.

Another and more serious source of error in the accompanying tables is the fact that, since our main survey was confined to the eight school grades, many children in the largest families of the general population were not caught in our group. Moreover, the tables include both completed and incompleted families, for to have based the tables upon the completed families alone would have favored the selection of late-order births. Accordingly, in many cases it is to be expected that later births will change the relative position of a given child in the table. Absolute position, of course, will not be changed, but a child who is now the oldest of three may become the oldest of four, five, etc.

TABLE 26.

ORDER OF BIRTH—BOYS

(Based on total number of pregnancies.)

Size of Family	Order of Birth 1	2	3	4	5	6	7	8	Total
1	49	–	–	–	–	–	–	–	49
2	46	39	–	–	–	–	–	–	85
3	25	26	26	–	–	–	–	–	77
4	18	14	5	10	–	–	–	–	47
5	7	5*	7	4	5	–	–	–	28
6	2	2	3	–	1*	4	–	–	12
7	–	1	1	–	–	–	2	–	4
8	–	–	–	–	–	–	–	1	1
9	–	–	–	–	1	1	–	–	2
Total	147	87 + 1	42	14	7	5	2	1	305

* Includes one pair of twins, counted as one birth. (In 12 cases order was not stated.)

TABLE 27.

ORDER OF BIRTH—GIRLS

(Based on total number of pregnancies.)

Size of Family	Order of Birth 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total
1	39	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	39
2	41	29	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	70
3	27	19	18	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	64
4	14	12	10	14	–	–	–	–	–	–	–	–	–	–	–	–	–	–	50
5	4	3	8	4	4	–	–	–	–	–	–	–	–	–	–	–	–	–	23
6	1	2	1	3	–	1	–	–	–	–	–	–	–	–	–	–	–	–	8
7	–	1	1	1	1	1	–	–	–	–	–	–	–	–	–	–	–	–	5
8	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	1
9	–	–	–	–	–	–	1	–	2	–	–	–	–	–	–	–	–	–	3
10	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	1
11	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
12	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
13	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	1
14	–	–	–	–	–	–	–	–	–	–	–	–	2*	–	–	–	–	–	2
15	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
16	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
17	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
18	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	2
Total	126	66	38	22	6	2	1	1	2	0	0	1	2	0	1	0	1	0	269

* Includes one pair of twins, counted as one birth. (In five cases order was not stated.)

The tables should then be considered suggestive rather than conclusive, and this only as regards the small families; in the large families, as we have stated, the older children would often be beyond the age limits of our group. Nevertheless the figures are interesting to compare with the corresponding figures from Cattell. The line across the middle of tables 26-28 is intended to call attention to the fact that the figures for birth orders beyond four are of questionable validity.

TABLE 28.

ORDER OF BIRTH—SEXES COMBINED

(Based on total number of pregnancies.)

Size of Family	Order of Birth 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Total
1	88	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	88
2	87	68	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	155
3	52	45	44	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	141
4	32	26	15	24	–	–	–	–	–	–	–	–	–	–	–	–	–	–	97
5	11	8*	15	8	9	–	–	–	–	–	–	–	–	–	–	–	–	–	51
6	3	4	4	3	1*	5	–	–	–	–	–	–	–	–	–	–	–	–	20
7	–	2	2	1	1	1	2	–	–	–	–	–	–	–	–	–	–	–	9
8	–	–	–	–	1	–	–	1	–	–	–	–	–	–	–	–	–	–	2
9	–	–	–	–	1	1	1	–	2	–	–	–	–	–	–	–	–	–	5
10	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	1
11	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
12	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
13	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	1
14	–	–	–	–	–	–	–	–	–	–	–	–	2*	–	–	–	–	–	2
15	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
16	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
17	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
18	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	1	–	2
Total	273	153	80	36	13	7	3	2	2	0	0	1	2	0	1	0	1	0	574

* Includes one pair of twins, counted as one birth. (In 17 cases order was not stated.)

The following figures give the per cent of birth of each order for families of 2, 3, or 4 children. Cattell's figures for American men of science are given in parentheses.

Size of Family	Order of Birth			
	First	Second	Third	Fourth
2	56.1% (57.4%)	43.9% (42.6%)		
3	36.9% (44.0%)	31.9% (31.2%)	31.2% (24.8%)	
4	33.0% (36.1%)	26.8% (22.4%)	15.4% (21.8%)	24.7% (19.7%)

There is a very striking agreement between Cattell's data and our own for families of two children. In each case nearly three-fifths are first born. The agreement is only moderately close for families of three and four children, which may be explained on the hypothesis that first born gifted in families of three or four children were more likely to have been missed because they had advanced beyond the eighth grade. It has been suggested that the better chance which the first born apparently has of becoming a leading man of science may be due to greater educational opportunities enjoyed by the first born. This alleged educational advantage is, of course, hypothetical but, even if it were actual, one might very well doubt whether the effect would register in the Binet IQ to almost exactly the same degree as in scientific performance, especially since the IQ's were taken in childhood, while the supposed influence of environment upon scientific performance would presumably depend chiefly on the relative amount of schooling enjoyed by first born and later born *after* the years of childhood. Such facts seem to render the environment hypothesis very questionable.

However, before accepting the above findings it would be necessary to rule out all factors tending to bring about an atypical selection of cases, and this is extremely difficult if not impossible. The misleading effect of the selective factor is illustrated by considering the data for the 92 completed families. It might at first be supposed that the data for these families would, except for the small number, be more valid than for the entire group. Actually they have no validity at all. The completed families in our group show an atypically small proportion of gifted first born, for the reason that our main search, being confined chiefly to grades 3 to 8, yielded few children above 13 years of age. The eldest child in a completed family would frequently, if not in a majority of

cases, be older than 13, and would therefore be less likely to be caught in our survey. The enormous effect of this vitiating factor is shown in Table 29.

TABLE 29.

ORDER OF BIRTHS OF GIFTED IN 92 COMPLETED FAMILIES

Number of Pregnancies	Order of Birth of Gifted Children													Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	
1	10	–	–	–	–	–	–	–	–	–	–	–	–	10
2	7	17	–	–	–	–	–	–	–	–	–	–	–	24
3	1	4	12	–	–	–	–	–	–	–	–	–	–	17
4	1	1	3	12	–	–	–	–	–	–	–	–	–	17
5	1	1	4	1	4	–	–	–	–	–	–	–	–	11
6	1	–	1	–	1	4	–	–	–	–	–	–	–	7
7	–	–	–	–	1	–	1	–	–	–	–	–	–	2
8	–	–	–	–	1	–	–	1	–	–	–	–	–	2
9	–	–	–	–	–	1	1	–	2	–	–	–	–	4
10	–	–	–	–	–	–	–	1	–	–	–	–	–	1
11	–	–	–	–	–	–	–	–	–	–	–	–	–	0
12	–	–	–	–	–	–	–	–	–	–	–	–	–	0
13	–	–	–	–	–	–	–	–	–	–	–	1	2	3
Total	21	23	20	13	7	5	2	2	2	0	0	1	2	98

(In three additional cases information was not clear.)

The fact that a selective factor could give results like those in Table 29 illustrates the necessity of caution in interpreting data of this kind. In this case completed families having a gifted first born were rarely caught. Possibly in the case of incomplete families, those with gifted first born were *more* likely to be caught. Such would certainly tend to be the case with the families most incomplete, since the gifted second born of the youngest parents would not yet have reached the third grade. However, it will be noted that our data for families of two and three children agree very closely with those of Cattell, and it does not seem probable that Cattell's figures could be subject to the kind of error we are considering.

MORTALITY STATISTICS REGARDING PARENTS

In the case of 502 of the 578 families of our main gifted group, including 591 of the total 643 children in the group, the physicians made note of whether the parents were living or dead. This includes all the families of the main group in

which the children were given a medical examination. Among these 591 children, 2 (0.33 per cent) were orphans and 53 (8.9 per cent) were half orphans. With the number of half orphans at about 9 per cent, the number of full orphans expected by chance would be about 0.81 per cent. (.09 x.09=.0081). This is not far from the proportion found.

Strange to say, the number of deceased fathers reported is more than three times that of deceased mothers; namely, 42 fathers as compared with 13 mothers. These numbers are, respectively, 8.37 per cent and 2.6 per cent of the total number of parent pairs (502), a difference large enough to raise considerable question of accuracy. Two possible sources of error suggest themselves. (1) The reports were made in nearly all cases by the mothers when they brought the child for medical examination. It is possible that some of these were stepmothers but did not divulge the fact. One might assume that the death of a father would always be reported by the mother; one could not safely assume that every stepmother would report that she was a second wife and that she had nothing to do with bringing into the world the child found to be so exceptionally superior! (2) A second source of error lies in the possibility that among the 75 or 80 mothers who could have brought the child for a medical examination and failed to do so, there was a disproportionate number of stepmothers. This source of error is probably less serious than the first. If neither of these errors has entered, and the excess of widowed mothers is a true one, the explanation might be that children of widowed mothers stood a better chance of being caught in our survey because of extra attention or instruction in the home. One might expect widowed mothers to lavish more affection upon their offspring, but as a class they certainly do not have more time to devote to them.[1]

The causes of death in the case of these 42 fathers and 13 mothers were reported (to our physicians) as follows:

Chronic Illnesses of Parents

Chronic illnesses of parents were reported to our physicians as shown in Table 31. The numbers are, of course, too small to be statistically significant, even if one

[1]A part of the discrepancy is due to the greater age of fathers.

TABLE 30.

CAUSES OF DEATHS OF PARENTS

	Total	
	Father	Mother
Accident	7	1
Unknown	3	2
Tuberculosis	3	2
Influenza-pneumonia	4	1
Heart disease	4	0
Influenza	2	1
Appendicitis	2	0
Pernicious anæmia	2	0
Nervous breakdown	2	0
Diabetes	1	1
Septicemia	1	1
Pneumonia	1	1
Hernia operation	1	0
Peritonitis	1	0
Cancer of liver	1	0
Nephritis	1	0
Meningitis or Encephalitis	1	0
Sciatica	1	0
Tuberculosis of kidney	1	0
Disease of gall bladder	1	0
Nephrectomy	1	0
Childbirth	0	1
Gangrene	0	1
Suicide	0	1
Old age	1	0
Total	42	13

could assume entire accuracy of report. One notes, however, that the mothers report 50 per cent more illnesses for themselves than for their husbands! These illnesses do not include tuberculosis and lues (syphilis), which were reported separately.

TABLE 31.

CHRONIC ILLNESSES OF 502 PARENTS

	Total	
	Father	Mother
Nervous troubles	7	12
Hay Fever	6	7
Asthma	3	5
Goiter	0	8
Deafness	0	5
Heart disease	0	4

	Total	
	Father	Mother
Rheumatism	4	0
Encephalitis	1	1
Cancer	0	2
Insanity	1	1
Neurasthenia	1	1
Neuritis	1	1
Dyspepsia	1	1
Lead poisoning	1	1
Pleurisy	1	1
Kidney trouble	1	1
Urticaria	1	0
Chronic indigestion	1	0
Paralysis and Hodgkins disease	1	0
Low blood pressure and anæmia	1	0
Gall stones	1	0
Otitis	1	0
Mastoid	1	0
Locomotor ataxia and alcoholic neuritis	1	0
Arthritis (rheumatoid)	1	0
Palsy	1	0
Gastric ulcers	1	0
Hyperthyroidism	0	1
Hyperthyroidism (suspected)	0	1
Diabetes mellitus	0	1
Tumor	0	1
Vaginal discharge	0	1
Prolapsus	0	1
Pelvic trouble	0	1
Dementia præcox	0	1
Cardiac asthma	0	1
Recurring abscesses	0	1
High blood pressure	0	1
Cataract	0	1
Scoliosis	0	1
Disease of gall bladder	0	1
Illness (not stated)	1	0
Total:	40	65
Minus duplications	0	4
	40	61

Duplications: 1 mother, goiter and hyperthyroidism
1 mother, heart disease and nervous troubles
1 mother, heart disease and goiter
1 mother, hay fever and asthma

Longevity of Grandparents of Gifted

It was thought that longevity of ancestors might throw some light on the virility of the stock from which the gifted children come. As the parents are in the large majority of cases still living, grandparents were used for comparison with the general population. Since not all of the grandparents were dead, it was necessary to take account of the life expectation of those still living. The longevity index for grandfathers only was calculated. The formula used was supplied by Dr. Truman L. Kelley and is as follows:

$$\frac{(\Sigma L^{\circ}_{e\,xq} + \Sigma D_{xd}) - (\Sigma L^{\circ}_{e\,xb} + \Sigma D^{\circ}_{e\,xb})}{N} \quad \text{in which}$$

$\Sigma L^{\circ}_{e\,xq}$ = Total life expectation according to U. S. Life Tables of living grandfathers of gifted at time of questionnaire, plus age at that time.

ΣD_{xd} = Sum of deceased grandfathers' ages at time of death.

$\Sigma L^{\circ}_{e\,xb}$ = Total life expectation of grandfathers reckoned from the birth of the child's parent, plus age at that time, for grandfathers who are living.

$\Sigma D^{\circ}_{e\,xb}$ = Total life expectation of grandfathers at time of birth of child's parent, plus age at that time, for grandfathers who are dead.*

* The meaning of the individual symbols is as follows:

Σ = summation;
L = living;
D = dead;
$^{\circ}_{e\,x}$ = expectation of life at any given age, plus age at that time;
$_q$ = date of questionnaire;
$_b$ = date of child's birth.

The comparative figures are taken from the *U. S. Life Tables,* by Glover. Table 4 (for all white males in the original registration states) was used.

Substituting the values as found for the above formula we have

$$\frac{(33{,}007.265 + 42{,}907.5) - (27{,}454.48 + 45{,}827.148)}{1{,}117}$$

Solving gives 2.35 years of life, in excess of expectation, for grandfathers of gifted children.

This difference of 2.35 years is, for two reasons, too small. (1) It is based upon the theoretical expectation of life under the conditions prevailing in the United States in 1921. However, many of the grandfathers died a number of years ago, a considerable proportion of them in foreign countries, and the hazards of living to which they succumbed were greater than those in the United States in 1921. Under modern American conditions it is fair to assume that on the average they would have lived somewhat longer. (2) The formula gives credit only for excess years of life already completed. It allots to the grandparents still living only as many additional years of life as to the average man of equal age. These grandfathers have already lived an average of 2.35 years of life in excess of the average man who lives to the age which the grandfathers had attained at the time of the birth of the gifted child's father, and the future is more likely to increase rather than decrease this advantage.

Tuberculosis and Lues Among Relatives

Under the caption "Tuberculosis" the physicians recorded the information given by mothers relative to history of tuberculosis in parents and other near relatives. The following figures are therefore not limited to existing cases of the disease, but are based upon all cases for which a history of tuberculosis was reported.

Table 32.

Tuberculosis Among Relatives

	Dr. Moore			Dr. Bronson			Total		
	Yes	No	% of subjects	Yes	No	% of subjects	Yes	No	% of subjects
Tuberculosis in one or both parents	19	213	8.2%	8	262	3.0%	27	475	5.4%
Tuberculosis in direct line (parents or grandparents)	41	191	17.7%	28	242	10.4%	69	433	13.7%
Tuberculosis in family, including parents, grandparents, uncles, aunts, and cousins	73	159	31.5%	49	221	18.1%	122	380	24.7%

The per cents in Table 32 are per cents of children, not of relatives. The figures reported by Dr. Moore (Los Angeles) are in each case much higher than those reported by Dr. Bronson (San Francisco Bay region). This is probably accounted for by the fact that the climate of Southern California attracts many families in which there is a tendency to tuberculosis. The reports for parents are probably fairly accurate and show that about one child in twenty has at least one parent with a history of tuberculosis. The reports for more distant relatives are doubtless less complete. From these figures one could hardly infer that the incidence of tuberculosis in these families is excessive.

The data on lues (syphilis) can not be taken as complete. The reports include only two cases, one a father, one a great-uncle. There are two other probable cases, both parents of one of the children.

Hereditary Diseases and Defects

Histories of insanity among relatives were reported to the physicians as follows:

	Male	Female	Total	Per cent of Gifted Group
Parents	2	2	4	0.4%
Grandparents and great-grandparents	11	5	16	0.3%
Other relatives, sex not always stated	—	—	37	—

Six families report 2 cases each; one, 3 cases; and one, 6 cases. Thus, 1.6 per cent of the families furnish 36.8 per cent of all cases of insanity reported. The information regarding the last mentioned family was not reported on the medical blank, but was furnished by the superintendent of the orphanage in which the child is living. The family of this child, on the maternal side, is reported to consist almost entirely of insane, criminal, or mental defectives, although one cousin is reported as "very brilliant and a talented violinist." We have no reliable information as to the paternal ancestry of this child.

Only 15 cases of feeble-mindedness among relatives were reported to the physicians: none in parents, grandparents, or great-grandparents; one sib of a gifted child; other relatives,

14. This does not include the information just mentioned which was furnished by the orphanage superintendent for one of our group. One family reports 5 cases (four uncles and one cousin, all in the paternal line). This is a third of the total number of cases reported.

There were 19 cases of epilepsy reported: direct line, none; sib of child, 1; grandparents and great-grandparents, 6; other relatives, 12.

Information regarding "other nervous" tendencies was regularly asked for by the physicians. Under this heading are recorded hysteria, insomnia, and cases described as "very nervous," "high strung," etc. For the most part the defects mentioned appear to be of relatively minor importance. The following cases were reported: sib of child, 1; fathers, 10; mothers, 24; other relatives, 30. Of the 65 cases, 54 were reported by Dr. Bronson. Dr. Bronson's figures are high largely for the reason that she included in her positive records the mothers who impressed her during the interview as having nervous tendencies, whether they reported such tendencies or not.

Asthma and hay fever, which are frequently classified as nervous diseases, were reported as follows:

	Male	Female	Total	Per cent of Group
Asthma:				
Gifted Children	4	2	6	1.02%
Sibs of Gifted	3	2	5	—
Parents of Gifted	9	7	16	1.6%
Other Relatives	–	–	15	—
Hay Fever:				
Gifted Children	2	0	2	0.3%
Parents of Gifted	13	11	24	2.4%
Other Relatives	–	–	50	—

Goitre:

Eighteen cases were reported.

Gifted Children	1
Sibs of Gifted	2
Parents of Gifted	9
Other Relatives	6
Total	18

Cancer:

Fifty-two cases of cancer were reported, 38.5 per cent of which were reported by 1.2 per cent of the families.

Parents of Gifted	4
Grandparents and Great-grandparents	38
Other Relatives	10
Total	52

Only three cases of chorea were reported in the medical blanks; one of the gifted children, one sib, and one parent. The Home Information Blank reports one additional case among the gifted children.

One father is reported as having palsy, one mother as having severe hysteria, with what appears to be hysteria hemiplegia. These are not included in the data mentioned above on "other nervous" tendencies.

If the figures on insanity, feeble-mindedness, epilepsy, and other nervous diseases are taken at their face value, the showing made by these families is much superior to that which would be found for a random group of families in the general population. However, it is unsafe to assume that these mothers reported all cases of nervous defect of which they had knowledge, notwithstanding the assurance given them that the records would be kept in locked files and treated as entirely confidential as far as individual cases were concerned. In view of the possible error from this source, it is hardly worth while to make any comparison of the findings with statistics for the general population.

Summary

1. The 92 mothers who are 45 years old or older report an average of 3.35 births, exclusive of miscarriages. This is to be compared with 4.7 found by Galton a half century ago for fertile marriages of English men of science, with 5.45 found by Ellis for fertile marriages of British men of distinction, and with 3.67 as the average size of family from which the parents of our gifted children have come.

2. There is a low but probably significant negative correlation ($-.214 \pm .07$) between schooling of mid-parent and number of living births. There is a correlation of $-.271 \pm .062$ between IQ of child and number of living births. The

latter correlation is only reduced to –.246 when the effect of schooling is eliminated by the method of partial correlation.

3. The proportion of miscarriages to pregnancies in the completed families is probably not more than half the normal for mothers of the generality. Infant mortality in these families has also been extremely low.

4. The average age of the father at the birth of a gifted child was 33.63 years, (S.D., 7.70); of mothers, 29.01 years, (S.D., 5.64). These figures are slightly lower than those reported by Cattell for parents of American men of science.

5. The data on order of birth, as far as they may be considered valid, are in striking agreement with Cattell's figures in showing a preponderance of first-born gifted in families of two or more. The fact that superiority of the first born registers in childhood as clearly as in the achievements of adult life suggests that the causes are to be sought in native endowment rather than in environment and education.

6. The number of deceased fathers reported is 42; of deceased mothers, 13. The causes of death are too scattered to be statistically significant.

7. Forty fathers (8 per cent) and 61 mothers (12 per cent) have one or more chronic illnesses, many of which are of minor importance. This is probably less than would be found for adults of corresponding age in the general population. There is a record of tuberculosis in one or both parents of 5.4 per cent of the children.

8. The longevity of the grandfathers of the gifted subjects is at least 2.35 years, and probably more than that amount, in excess of the expected.

9. Four parents (0.4 per cent), 16 grandparents and great-grandparents (0.3 per cent) and 37 other relatives were reported to the physicians as having had a record of insanity. Very few other cases of hereditary defect were reported.

CHAPTER VII

ANTHROPOMETRIC MEASUREMENTS

Bird T. Baldwin

In the spring of 1923 Dr. Terman invited the writer to coöperate in a comprehensive investigation of a group of intellectually gifted children whom he had selected in California. The aim, scope, and methods of the entire investigation are described in the previous sections of this book. The problem assigned was to make an anthropometric study of the status of the physical growth of these children.[1] The purpose was (1) to secure an accurate picture of the status of physical development of each of the gifted children through a series of selected physical measurements; (2) to make a comparison of their total and partial growth with that of other groups; (3) to determine the relationships of various physical traits measured; and (4) to analyze the correspondence of the physical status and mental status of this group of children.

Method of Work

In order to insure good anthropometric laboratory conditions, it was decided to establish centers equipped with standard laboratory facilities at Los Angeles, San Francisco, and Stanford University for the three main districts. The children from the suburbs of Los Angeles and the surrounding small towns came to Los Angeles to be measured, those from Berkeley, Alameda, and Oakland, to San Francisco, and those from the towns near Palo Alto, to Stanford University. Many of the children lived so far from the center that an entire day was required for the parent and the child

[1]Miss Beth Wellman, research assistant in anthropometry and psychology in the Iowa Child Welfare Research Station, coöperated in all phases of this investigation and made all the measurements under the writer's immediate supervision. The measurements were recorded by Miss Marguerite Drew, a graduate student in Stanford University. Material help has been given by other assistants in the Station. A grant of $1,000 in addition to Miss Drew's salary was allowed from Doctor Terman's budget for the expenses of securing the original data.

to make the trip. At each of the centers the laboratory was located in the most accessible part of the city; it consisted of a measuring room, waiting room, and small dressing rooms.

The parents were requested by a form letter to bring their children at specified hours on days designated. Arrangements were made with the superintendents of schools in the various cities for excusing the children from school work whenever it was necessary. Almost all the children notified came to the laboratory.

The measuring began the first week of April and continued for thirteen consecutive weeks. The total number of children measured was 623, most of whom belonged to the group which has been designated as the main experimental group. Twenty-nine of these were not included in the statistical treatment because they had IQ's of less than 130 (although they had special abilities) or because they had been examined by group intelligence tests only. The 594 children included 312 boys and 282 girls, with IQ's ranging from 130 to 189. They were distributed by age as follows:

Age in Years[1]	Boys	Girls
2		1
3	1	
4	2	2
5	3	5
6	6	4
7	10	13
8	14	15
9	29	23
10	35	42
11	68	48
12	63	45
13	50	46
14	26	29
15	5	9
	312	282

Measurements. Thirty-seven careful anthropometric measurements were taken on each child, without clothing, making a total of 21,978 measurements on the 594 children. The original records giving the data of the measurements for

[1]In this chapter age is taken to the nearest birthday. For example, age 10 means 9 years, 6 months, to 10 years, 5 months, and 29 days. The above ages are as of date when the physical measurements were taken.

each child are on file at the Iowa Child Welfare Research Station and in duplicate at Stanford University. The measurements selected were:

Height:
- Standing
- Sitting
- Stem length to vertex
- Stem length to sternal notch

Head:
- Anterior-posterior diameter
- Transverse diameter
- Height
- Circumference
- Width of face
- Length of face

Shoulders:
- Width

Arms:
- Span
- Length from shoulder to elbow, right and left
- Length from elbow to finger tip, right and left
- Circumference of upper, relaxed and flexed, right and left
- Width of wrist, proximal and distal, right and left
- Circumference of wrist, right and left

Chest:
- Width
- Depth
- Circumference

Hips:
- Width at ischia
- Width at trochanters
- Circumference

Legs:
- Length

Breathing capacity

Grip:
- Right
- Left

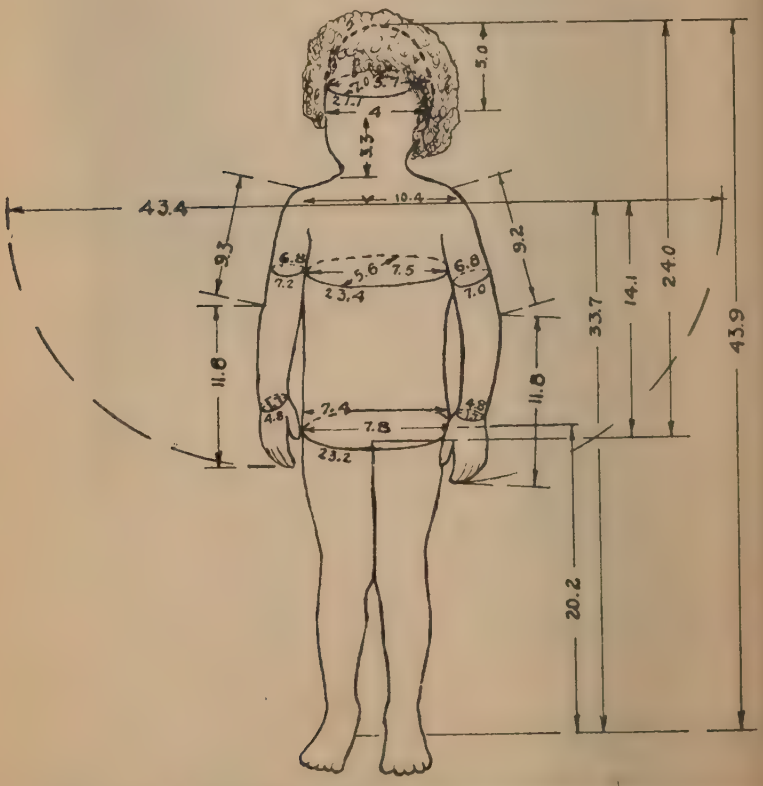
Weight, nude

All measurements were taken in the metric units and the final results translated into the English units for this report. The actual time required for making the measurements for each child with the aid of the recorder was about 20 minutes.

Figure 2 gives the location and actual measurements of

31 physical traits on the fourth boy measured. He is 6 years of age, and has an intelligence quotient of 154. He holds a remarkable record for swimming and diving. He also plays the violin for public exhibition and is a movie actor. The boy is slightly below medium height and his weight is slightly above the Iowa pre-school norm for his height. He is above

FIGURE 2.
LOCATION OF PHYSICAL MEASUREMENTS



The location of the measurements made on all the mentally superior California children are shown by the lines in this diagram. The vertical lines to the right indicate the height measurements; the ellipses, the circumferences; the short horizontal lines, the diameters; the long horizontal line through the shoulders, the span of arms; and the slanting lines on the head and chest, the depths.

the norm in breathing capacity and chest measurements, both for his height and age and for his weight and age. His shoulders are broader than those of the average child of this age.

Instruments. The apparatus and instruments were those used in the Iowa Research Station Laboratory, including the measuring board for height, benches, square, plumb-line, sliding and spreading calipers, tapes, and metric rule, supplemented by scales, a spirometer, and a hand dynamometer from the psychological laboratory of Stanford University. All instruments except the hand dynamometer were carefully standardized before the work was started; the hand dynamometer, Smedley No. 256, was later sent to the Bureau of Standards, Washington, where corrections were found necessary after careful testing. Since the errors ranged from –2.8 kg. to –1.7 kg. at five unit intervals up to 50 kg. on the scale, the average error was found to be –2.17 kg. for the boys and –2.33 kg. for the girls. The averages, deviations, probable errors, and coefficients of variability given for grip are for the corrected measurements.

The technic of taking the measurements was that described by the writer in his *Physical Growth of Children from Birth to Maturity,*[1] and revised in his new book on the same subject now in preparation.

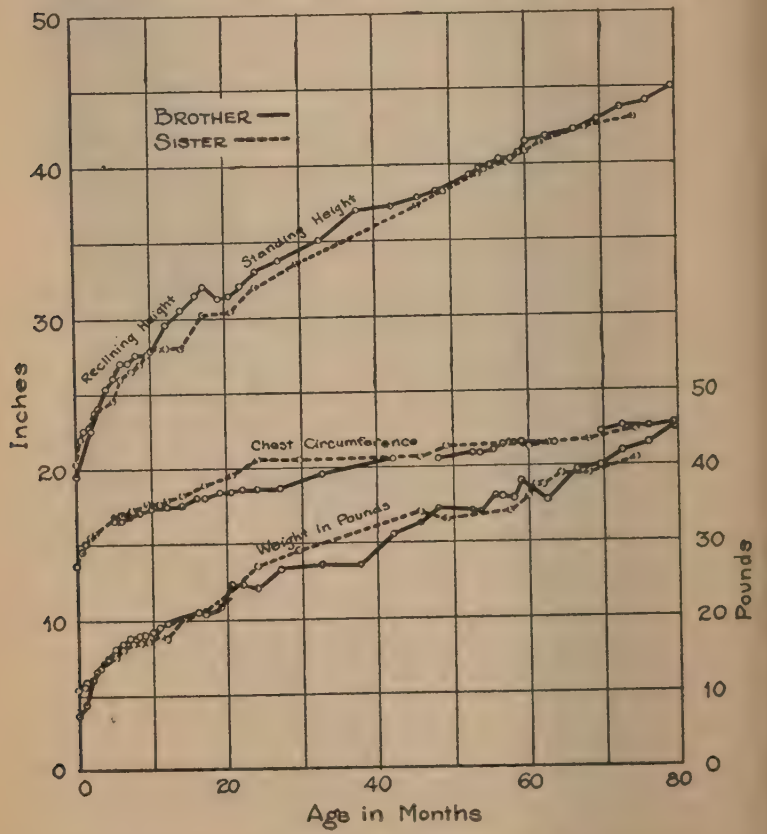
Coöperation of parents and children. The attitude and the coöperation of the parents and children were exceptionally good throughout the entire study. In general, the children appeared to be physically well developed and normal. Mentally they were alert and quick to respond. Socially they were well mannered and showed good spirit. The parents of the mentally superior children, as a rule, showed a great interest in the welfare and training of their children. In a few instances we were able to get valuable data on the physical growth of the children from original diaries. Figure 3 gives the individual growth curves from birth of a brother and sister included in the study. The girl is of medium height; at 6 years 6 months, she is 0.7 per cent underweight, average in breathing capacity, 1.1 inches above the norm in width of

[1]Baldwin, B. T.: *Physical Growth of Children from Birth to Maturity.* State University of Iowa, Iowa City. *Studies in Child Welfare,* 1921, I, No. 1. p. 411.

shoulders, and 0.9 pounds below the norm in right grip. The boy is also of medium height; at 11 years 2 months, he is 8.7 per cent overweight, 10 cubic inches above the norm in breathing capacity, 0.1 inch above the norm in width of shoulders, and 8.0 pounds below the norm in right grip. The

FIGURE 3.

INDIVIDUAL GROWTH CURVES OF TWO SIBS, BROTHER AND SISTER



The boy underwent tonsillectomy at 39 months, and had chicken-pox at 52 months, and whooping cough at 57 months. The girl had whooping cough at 2 months, double bronchitis at 6 months, diphtheria at 35 months, measles at 37 months, removal of tonsils and adenoids at 62 months, and bronchitis at 65 months. The effect of the diseases is seen in the irregularity of gain in weight of both sibs.

curves show steady growth in height, but somewhat retarded growth in chest development and irregular growth in weight. They also show that the diseases indicated, except diphtheria for the girl, affected growth in weight, but had little apparent effect on height or chest growth. There is a drop in weight following measles for the boy, followed by marked gain. For both the boy and girl there is an acceleration in weight after the removal of tonsils and adenoids. Since reclining height is longer than standing height for the same individual, the height curves dropped back when standing height was first taken instead of reclining height at 19 months for the boy and at 14 months for the girl.

When the work on physical measurements was begun, the parents had already acquired an intelligent interest in the larger survey of the characteristics of mentally superior children and had become acquainted with the results of specialized examinations. In order to meet the very large number of requests for the results of the physical measurements, a form letter was forwarded to the parents or guardians for each child. The letter is reproduced on pages 142–143.

REPORT TO PARENTS ON PHYSICAL MEASUREMENTS

Stanford University, ...

Child's name.....Date of birth.....

Parent or Guardian.....Address .....
(Parent should notify Professor L. M. Terman of any change of address)

Age of child when measured.....years.....mos. Date of measurement.....

HEIGHT: .....inches. This would classify the child as tall, medium, short, according to our American standards.

WEIGHT-HEIGHT-AGE INDEX: The weight, not counting clothing, was.....pounds. When.....% is added for clothing the weight is.....pounds. The standard weight, with clothing, FOR THIS SEX, AGE, AND HEIGHT, is.....pounds. The child is therefore.....% overweight, underweight. A deviation of only a few pounds from normal weight is not considered significant, but children under 10 years who are 6% or more underweight for their height and age, and those over 10 years who are 8% or more underweight for their height and age, are likely to be in need of medical attention. Children who are 15% overweight for their height and age may also be in need of medical attention.

A copy of the Baldwin-Wood weight-height-age table is enclosed, giving the standards for boys on one side and those for girls on the other. The use of the table may be illustrated as follows: Con-

sider a boy whose height is 64 inches. On the boys' table find 64 in the first column. The next column shows the average weight for boys of this height to be 117 pounds. However, the normal weight for this height varies according to age. As shown in the age-column to the right, it is 109 pounds for 12 years, 111 pounds for 13 years, etc. Age is counted to the nearest birthday. The weight-height-age index is a significant indication of nutritional status. The table should be preserved for later comparisons.

BREATHING CAPACITY: .....cubic inches. The standard for this height and age is.....cubic inches. Children who are 20% or more below the standard may be in need of special attention.

STRENGTH OF GRIP: .....pounds. The standard for this age is.....pounds, and in comparison with this standard the child rates high, medium, low. Strength of grip is a rough index of general muscular status.

WIDTH OF SHOULDERS: .....inches. The average for this age is.....inches. This measure to a certain extent indicates a child's general physical robustness.

NOTE: The above measurements give a cross-section picture of your child's physical status at the time they were made. However, the most important question is not how large or how small a child is at a given age, since children vary in size with nationality, heredity, season, etc. It is more important to know WHETHER THE CHILD IS GROWING PROPERLY. This can be determined by measuring the child year by year and comparing the measurements.

Our study of several thousand individual growth curves based upon repeated measurements of the same children shows that tall children as a rule remain tall, and that short children as a rule remain short, although there are exceptions. Tall children also tend to mature earlier and to reach their final stature earlier than short children. They are usually accelerated physiologically.

Very sincerely yours,

BIRD T. BALDWIN,

Director of Iowa Child Welfare Research Station, University of Iowa.

Comparison of the Group with Other Groups in Various Sections of the United States

Since the weight-height relationship of a child furnishes one of the best general criteria for its physical status, the average heights and weights for all the children included between the ages of 7 and 15 were first computed and the results compared with those of earlier writers on California children and on a few representative groups in other parts of the United States. The results given in Table 33 show at a glance that this group, measured by the group average, is physically superior in both height and weight for age, although several children are small and some are considerably underweight. The Oakland children measured by Barnes[1] in 1892 are considerably inferior to this group, although they were heavier and taller than similar groups of children from Boston, Worcester, Toronto, St. Louis, and Milwaukee, whose records were displayed at the World's Fair in Chicago in 1893. The Oakland children later studied by Boas[2] were superior to those studied by Barnes, but inferior to those included in this study. The Davenport group represents a selection from the best residential district in the city. The Oak Park group is from one of the most favored social sections of Chicago. Faber's[3] study, in 1923, was of a group of California children. The California gifted children excel them all in height and weight, for all ages included. They also excel the early Boas-Burk[4] averages for the country at large, when approximately 90,000 children for height averages and 68,000 for weight averages between the ages of 5½ and 18½ years were included.

According to the standards in the new Baldwin-Wood tables for tall, medium, and short American children, based upon records from 124,000 well developed American born children measured without clothing, 44 of the 312 superior boys are tall, 233 medium, and 35 short. Of the 282 girls, 45 are tall, 208 medium, and 29 short. Of the boys, 176 are of normal weight for height, 89 overweight, and 42 underweight.

[1]Barnes, E.: Physical Development of Oakland Children. *Oakland School Rep.* 1892–1893, XCIII, 38–44.

[2]Boas, F.: On the Growth of First-born Children. *Science*, n.s. 1895, I, 402–404.

[3]Faber, H. K.: Personal Communication.

[4]Burk, F.: Growth of Children in Height and Weight. *Amer. Journ. Psychol.*, 1898, IX, 253–326.

Age	Height, Inches						Weight, Pounds					
	Baldwin California 1923	Barnes Oakland 1892	Boas Oakland 1897	Faber California 1923	Baldwin Oak Park 1922	Baldwin Davenport 1920	Baldwin California 1923	Barnes Oakland 1892	Boas Oakland 1897	Faber California 1923	Baldwin Oak Park 1922	Baldwin Davenport 1920
Boys												
7	48.5	45.0	46.5	47.1	47.3	47.0	55.8	50.3	51.7	51.3	50.9	48.5
8	50.6	47.6	49.2	49.2	49.1	49.6	57.8	54.2	57.3	57.5	55.6	54.0
9	52.3	49.3	50.5	51.2	51.4	50.7	68.6	59.5	62.2	62.9	62.2	58.4
10	53.7	51.9	52.5	53.3	53.5	52.5	71.4	66.8	69.0	71.1	69.4	59.5
11	56.2	53.5	54.3	54.7	55.2	55.5	82.2	72.1	74.8	75.3	76.0	73.2
12	57.9	55.1	56.1	56.8	57.2	56.1	87.5	77.8	81.6	83.2	82.9	75.2
13	59.9	56.8	58.4	58.8	59.6	57.9	95.4	89.5	89.1	91.1	94.6	81.1
14	62.6	59.7	61.3	61.4	61.4		109.3	97.0	105.1	103.3	105.3	
15	64.7	61.8	64.3	62.8	63.0		118.8	108.0	119.5	111.1	110.9	
Girls												
7	47.5	44.9	46.3	46.9	46.7	46.3	52.5	48.1	49.6	50.3	49.9	46.1
8	50.0	46.8	48.3	48.3	49.3	47.7	60.2	52.2	55.7	56.3	55.9	47.6
9	52.3	49.2	50.3	50.9	51.4	50.4	65.9	58.6	60.0	62.4	61.5	54.9
10	53.6	51.5	52.6	52.7	53.1	52.4	71.3	63.3	66.8	69.4	68.9	61.3
11	56.5	53.9	54.7	55.0	55.0	54.9	83.0	69.7	74.3	78.0	72.4	66.8
12	58.0	56.6	57.1	57.3	57.2	56.6	87.7	78.9	84.2	86.3	84.3	77.2
13	61.1	60.0	59.7	59.4	59.7	59.3	106.5	90.6	94.2	97.1	92.0	81.8
14	62.3	61.2	61.7	60.7	61.8		114.2	98.1	105.8	105.0	102.3	
15	64.0	61.9	62.1	61.3	63.0		128.0	108.9	110.7	110.7	114.8	

Baldwin, California—594 children between the ages of 7 and 15, without clothing.
Barnes, Oakland—4,956 children between the ages of 6 and 18, with clothing.
Boas, Oakland—4,207 children between the ages of 6 and 17, with clothing.
Baldwin, Oak Park—1,398 children between the ages of 6 and 14 with clothing.
Baldwin, Davenport—563 children between the ages of 5 and 13, with clothing.
Faber, California—7,463 children between the ages of 7 and 15, with clothing.

Of the girls, 143 are of normal weight for height, 88 overweight, and 51 underweight. The criteria for overweight and underweight were a deviation from the norm of more than 6 per cent for children less than 10 years of age, and 8 per cent for children 10 years and older. A more detailed analysis of tall, medium, and short children is given in Table 34.

TABLE 34.

RELATION OF WEIGHT TO HEIGHT, GIFTED CHILDREN

	Normal weight	Over-weight	Under-weight
Boys			
Tall	52.3%	31.8%	15.9%
Medium	56.5%	29.3%	14.0%
Short	68.4%	22.9%	8.4%
Girls			
Tall	46.7%	22.2%	22.1%
Medium	51.9%	33.2%	14.9%
Short	48.3%	31.0%	20.7%

DEVIATIONS FROM NORMS IN WEIGHT AND BREATHING CAPACITY

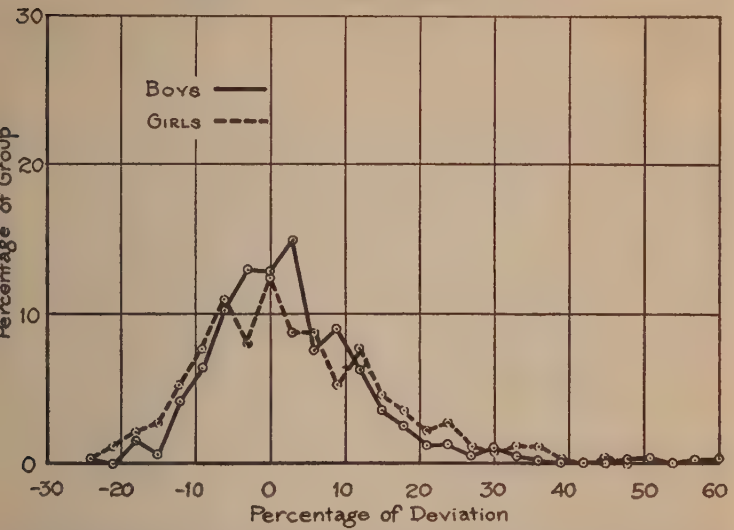
In order to get a graphic representation of the deviations from a standard group in weight and in breathing capacity of the gifted children, the distribution of the percentages of deviation for each child has been charted (Figs. 4, 5, and 6). The deviation in weight was calculated from the Baldwin-Wood weight-height-age norms for nude children, the deviation in breathing capacity from the unpublished Baldwin height-breathing capacity-age norms and nude weight-breathing capacity-age norms for American born children.

The curves for weight deviations show the range of deviations from the norms for the boys to be from —24 to +60 per cent and for the girls from —24 to +48 per cent. It should be noted, however, that 74.5 per cent of the boys and 62.4 per cent of the girls deviate less than 10 per cent from the norms.

One boy deviated 60 per cent below the breathing capacity norm, another 60 per cent above norm, but 72.6 per cent of the boys deviated not more than 10 per cent above or below the norm. One girl deviated 45 per cent below the norm and another 45 per cent above, but 68.3 per cent deviated not more than 10 per cent above or below the norm.

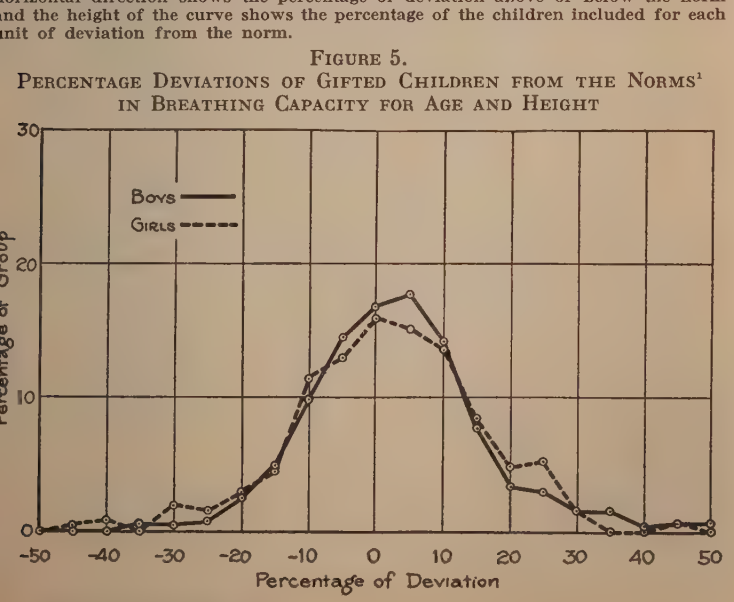
The results show a wide range of distribution on both

FIGURE 4.
PERCENTAGE DEVIATIONS OF GIFTED CHILDREN FROM THE BALDWIN-WOOD WEIGHT-HEIGHT-AGE NORMS



Distribution curve of deviations from the norm in weight for height. The horizontal direction shows the percentage of deviation above or below the norm and the height of the curve shows the percentage of the children included for each unit of deviation from the norm.

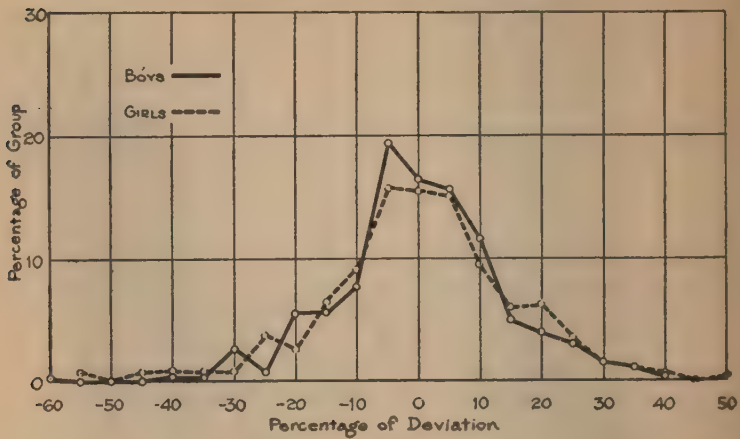
FIGURE 5.
PERCENTAGE DEVIATIONS OF GIFTED CHILDREN FROM THE NORMS[1] IN BREATHING CAPACITY FOR AGE AND HEIGHT



[1]Baldwin, unpublished data.

FIGURE 6.

PERCENTAGE DEVIATIONS OF GIFTED CHILDREN FROM THE NORMS[1] IN BREATHING CAPACITY FOR AGE AND WEIGHT



the positive and negative side of the norm for both height and breathing capacity. For weight the results indicate a fairly normal distribution, with a slight preponderance toward the positive side of the curve. For breathing capacity, when compared with weight-height-age norms, the curves are skewed toward the positive side of the distribution. As a group these mentally gifted children are superior in breathing capacity to unselected children.

RESULTS OF PHYSICAL MEASUREMENTS

In tables 35 and 36 the averages, standard deviations with their probable errors, and coefficients of variability for the measurements on the 37 physical traits are given for boys and girls from 7 to 15 years inclusive. The 24 children less than 7 years of age are distributed from 2 to 6 years of age and are therefore too few to treat by age groups. The average represents the central tendency of the group, but, of course, does not show individual variations or differences. The standard deviation is the amount of variation above and below the average in terms of the measurement for about 68 per cent of the children. The coefficient of variability is a

[1]Baldwin, unpublished data.

Age, years	7				8				9					
Number of cases	10				14				29					
Physical trait (measured in inches)	M.	S.D.	P.E. of S.D.	V.	M.	S.D.	P.E. of S.D.	V.	M.	S.D.	P.E. of S.D.	V.	M.	S
Height—standing	48.5	2.4	.4	4.9	50.6	1.7	.2	3.4	52.3	1.7	.2	3.2	53.8	
sitting	26.5	1.2	.2	4.4	27.4	.7	.1	2.6	28.1	.9	.1	3.3	28.6	
stem length to vertex	26.3	1.2	.2	4.6	27.0	.8	.1	3.0	27.7	.8	.1	3.1	28.1	
stem length to sternal notch	15.9	.9	.1	5.5	16.4	.8	.1	5.0	16.9	.6	.0	3.6	17.2	
Head—diameter anterior-posterior	7.1	.3	.0	3.9	7.1	.2	.0	3.1	7.2	.2	.0	3.1	7.1	
diameter transverse	5.7	.1	.0	2.3	5.7	.2	.0	3.3	5.8	.3	.0	4.9	5.7	
height	5.2	.2	.0	3.4	5.2	.2	.0	3.5	5.2	.2	.0	4.0	5.2	
circumference	21.2	.7	.1	3.1	21.1	.4	.0	2.1	21.2	.5	.0	2.5	21.1	
face width	4.1	.1	.0	3.1	4.2	.2	.0	4.0	4.3	.2	.0	3.9	4.3	
face length	3.7	.2	.0	4.4	3.8	.2	.0	3.6	3.9	.2	.0	3.6	3.9	
Shoulders—width	11.0	.6	.1	5.9	11.3	.4	.0	3.8	12.0	.6	.0	4.5	12.0	
Arms—span	48.4	2.6	.4	5.5	49.9	2.4	.3	4.9	52.1	1.9	.2	3.6	53.7	
shoulder-elbow left	10.2	.6	.1	5.8	10.7	.6	.1	5.3	11.1	.4	.0	3.9	11.5	
shoulder-elbow right	10.2	.6	.1	5.6	10.7	.6	.1	5.5	11.1	.4	.0	3.9	11.5	
elbow-finger tip left	13.2	.9	.1	6.4	13.6	.7	.1	4.9	14.0	.7	.1	4.8	14.4	
elbow-finger tip right	13.1	.9	.1	6.5	13.6	.7	.1	4.9	14.0	.6	.0	4.4	14.4	
upper arm circumference left	6.8	.6	.1	9.1	6.7	.3	.0	4.7	7.4	.7	.1	9.1	7.3	
upper arm circumference right	6.8	.6	.1	8.9	6.8	.3	.0	4.4	7.4	.6	.0	8.6	7.4	
upper arm flexed left	7.3	.6	.1	8.3	7.2	.3	.0	4.6	8.0	.7	.1	8.6	8.0	
upper arm flexed right	7.4	.6	.1	8.0	7.4	.3	.0	4.0	8.1	.7	.0	8.1	8.2	
wrist width proximal left	1.9	.1	.0	6.8	2.0	.1	.0	5.6	2.0	.1	.0	6.2	2.1	
wrist width proximal right	1.9	.1	.0	6.8	2.0	.1	.0	5.8	2.1	.2	.0	6.9	2.1	
wrist width distal left	1.7	.1	.0	4.5	1.7	.1	.0	4.6	1.9	.1	.0	5.1	1.9	
wrist width distal right	1.7	.1	.0	5.6	1.8	.1	.0	5.8	1.9	.1	.0	5.3	1.9	
wrist circumference left	5.2	.4	.0	7.3	5.3	.2	.0	3.7	5.6	.3	.0	4.6	5.7	
wrist circumference right	5.2	.4	.0	7.1	5.3	.2	.0	3.1	5.6	.3	.0	4.7	5.7	
Chest—width	7.6	.6	.1	7.6	7.8	.4	.0	4.9	8.1	.5	.0	5.7	8.2	
depth	5.7	.3	.0	5.6	5.7	.4	.0	7.4	6.1	.4	.0	6.6	6.0	
circumference	23.1	1.5	.0	6.3	23.5	1.1	.1	4.5	24.8	1.7	.2	6.9	24.8	
Hips—width ischia	8.1	.5	.1	6.1	8.1	.3	.0	3.9	8.5	.4	.0	4.9	8.6	
width trochanters	8.7	.5	.1	5.4	8.7	.4	.0	4.3	9.3	.5	.0	5.6	9.4	
circumference	24.3	1.2	.2	5.0	25.2	.9	.2	3.6	28.0	2.6	.5	9.2	27.5	
Leg—length	22.4	1.5	.3	6.5	25.1	1.2	.3	4.9	25.7	.9	.2	3.5	27.0	
Breathing capacity (cubic inches)	78.7	15.6	2.4	19.9	93.8	19.3	2.5	20.5	112.6	16.2	1.4	14.4	114.7	
Grip—left (pounds)	27.4	6.3	1.1	22.9	26.5	5.1	.7	20.9	37.6	6.0	.5	15.8	39.8	
right (pounds)	30.1	6.3	1.1	20.8	30.1	4.6	.6	15.1	39.9	6.5	.6	16.2	42.9	
Weight, nude (pounds)	53.9	7.4	1.1	13.6	55.8	4.0	.5	7.1	65.9	9.0	.8	13.6	68.9	
Cranial capacity (cubic inches)	82.6	4.6	.7	5.6	80.9	4.1	.5	5.1	82.4	4.8	.4	5.9	82.1	
Indices—														
sitting-standing	.55	.01	.0	2.0	.54	.01	.0	2.8	.54	.01	.0	2.0	.53	
cephalic	.81	.03	.0	4.1	.86	.07	.0	8.0	.81	.03	.0	4.0	.81	
chest	.75	.05	.0	6.1	.73	.05	.0	6.6	.74	.03	.0	4.2	.73	
weight-height	1.11	.11	.0	10.2	1.10	.06	.0	5.6	1.27	.15	.0	12.2	1.28	

ABLE 35.

EASUREMENTS OF 300 GIFTED BOYS

10		11				12				13				14				15			
35		68				63				50				26				6			
P.E. of S.D.	V.	M.	S.D.	P.E. of S.D.	V.	M.	S.D.	P.E. of S.D.	V.	M.	S.D.	P.E. of S.D.	V.	M.	S.D.	P.E. of S.D.	V.	M.	S.D.	P.E. of S.D.	V.
.2	3.2	56.2	2.5	.2	4.5	58.0	2.6	.2	4.5	59.7	3.3	.2	5.5	62.6	2.9	.2	4.7	64.1	7.2	1.5	11.3
.1	3.9	29.6	1.1	.1	3.8	30.3	1.3	.1	4.2	31.0	1.6	.1	5.1	32.4	1.8	.2	5.6	33.9	3.2	.7	9.4
.1	3.9	29.1	1.1	.1	3.9	29.8	1.3	.1	4.3	30.6	1.6	.1	5.3	31.9	1.8	.2	5.7	33.6	3.1	.7	9.3
.1	5.1	18.0	.9	.0	5.0	18.6	1.0	.1	5.2	19.2	1.3	.1	6.7	20.1	1.3	.1	6.8	21.5	2.4	.5	11.0
.0	3.4	7.2	.2	.0	2.9	7.3	.2	.0	3.3	7.3	.2	.0	3.2	7.4	.2	.0	3.0	7.4	.2	.0	3.1
.0	2.4	5.8	.2	.0	3.8	5.8	.2	.0	3.8	5.8	.2	.0	3.7	5.9	.2	.0	3.4	5.9	.2	.0	4.1
.0	3.2	5.2	.2	.0	3.1	5.3	.2	.0	3.6	5.3	.2	.0	3.8	5.3	.2	.0	3.6	5.3	.3	.0	4.9
.0	2.5	21.3	.6	.0	2.6	21.4	.6	.0	2.7	21.5	.6	.0	2.7	21.6	.6	.0	2.8	21.7	.6	.1	2.7
.0	3.9	4.4	.2	.0	4.6	4.4	.2	.0	4.4	4.4	.2	.0	4.0	4.5	.2	.0	4.4	4.5	.2	.0	4.5
.0	3.8	4.0	.2	.0	5.0	4.1	.3	.0	6.4	4.1	.2	.0	6.0	4.3	.2	.0	5.6	4.2	.3	.0	6.4
.0	4.7	12.5	.6	.0	4.8	12.9	.8	.0	6.1	13.3	.8	.0	5.8	13.9	.9	.1	6.3	14.3	1.7	.4	11.8
.2	4.4	56.4	2.6	.2	4.6	58.1	2.5	.2	4.4	60.0	3.6	.2	6.0	63.0	3.1	.3	5.0	64.9	7.2	1.5	11.1
.0	4.9	12.0	.7	.0	5.5	12.4	.6	.0	5.0	12.8	.8	.0	6.1	13.5	.7	.1	5.1	13.7	1.3	.3	9.7
.0	4.8	12.1	.7	.0	5.4	12.4	.6	.0	4.9	12.9	.8	.0	6.0	13.6	.7	.1	5.3	13.7	1.3	.3	9.1
.0	4.6	15.1	1.0	.0	6.4	15.6	.7	.0	4.9	16.2	1.0	.1	6.4	17.0	.9	.1	5.6	17.4	2.1	.4	11.9
.0	4.4	15.1	.7	.0	4.5	15.7	.7	.0	4.8	16.1	1.0	.1	6.4	17.0	.9	.1	5.4	17.3	2.1	.4	12.0
.1	8.3	7.8	.8	.0	10.5	7.9	.8	.0	9.8	8.2	.7	.0	9.1	8.5	.9	.1	10.2	8.7	1.1	.2	13.1
.0	7.8	7.8	.8	.0	10.0	8.0	.8	.0	9.8	8.3	.7	.0	9.0	8.7	.8	.1	9.5	8.9	1.1	.2	12.7
.0	8.5	8.5	.9	.0	10.6	8.7	.9	.0	9.8	9.0	.8	.0	9.0	9.4	.9	.1	10.1	9.8	1.4	.3	14.5
.1	11.7	8.6	.8	.0	9.8	8.9	.9	.0	9.7	9.3	.9	.0	9.3	9.7	.9	.1	9.3	10.4	1.4	.3	13.5
.0	5.3	2.2	.2	.0	6.5	2.2	.2	.0	8.6	2.3	.2	.0	7.8	2.4	.2	.0	7.5	2.5	.3	.1	11.2
.0	5.3	2.2	.2	.0	6.6	2.2	.2	.0	7.0	2.3	.2	.0	7.7	2.4	.2	.0	7.3	2.6	.3	.0	10.3
.0	4.7	2.0	.1	.0	6.7	2.0	.2	.0	7.1	2.1	.2	.0	7.5	2.2	.2	.0	6.5	2.2	.2	.0	10.2
.0	5.2	2.0	.1	.0	6.5	2.0	.2	.0	6.9	2.1	.2	.0	7.4	2.2	.2	.0	6.7	2.3	.2	.0	9.6
.0	4.9	5.9	.4	.0	6.7	6.0	.4	.0	6.7	6.3	.4	.0	6.6	6.5	.4	.0	7.0	6.6	.6	.1	9.6
.0	4.5	5.9	.4	.0	6.5	6.1	.4	.0	6.4	6.3	.4	.0	6.7	6.5	.4	.0	7.0	6.7	.6	.1	10.0
.0	5.5	8.6	.5	.0	5.8	8.9	.6	.0	7.1	9.1	.6	.0	6.0	9.5	.8	.1	8.9	10.1	1.2	.3	12.0
.0	5.0	6.3	.6	.0	8.4	6.5	.6	.0	8.4	6.6	.5	.0	7.5	7.0	.7	.1	10.6	7.2	.6	.1	8.6
.1	5.0	26.0	1.8	.1	6.9	26.8	1.9	.1	7.1	27.4	1.7	.1	6.0	28.8	2.6	.2	8.9	30.3	3.1	.7	10.4
.0	5.4	9.1	.6	.0	6.7	9.4	.7	.0	7.1	9.6	.6	.0	6.3	10.1	.7	.1	7.5	10.4	1.1	.2	10.6
.0	6.0	10.0	.7	.0	7.2	10.3	.7	.0	6.8	10.6	.8	.0	7.7	11.3	.9	.1	7.7	12.0	1.3	.3	10.4
.4	7.7	27.7	2.4	.4	8.5	28.2	1.9	.3	6.8	29.1	2.2	.4	7.5	—	—	—	—	—	—	—	—
.4	7.5	27.4	1.7	.3	6.1	29.4	1.9	.3	6.6	30.2	2.1	.4	6.9	—	—	—	—	—	—	—	—
1.4	15.1	120.3	21.9	1.8	17.0	145.1	24.5	1.5	16.9	157.2	26.4	1.8	16.8	180.7	30.3	2.8	16.8	212. 8	62.9	13.4	29.6
.4	13.6	44.5	6.3	.4	14.3	48.9	9.2	.6	18.8	54.1	11.2	.8	20.6	64.4	12.7	1.2	19.6	71.6	16.3	3.5	22.8
.4	12.3	48.5	8.6	.5	17.7	53.4	8.7	.5	16.3	58.8	11.7	.8	19.9	70.0	14.1	1.4	20.1	83.3	22.0	4.7	26.4
.7	13.3	77.9	14.0	.8	18.0	84.1	14.5	.9	17.3	91.5	15.0	1.0	16.4	105.2	18.4	1.8	17.5	111.0	27.1	5.8	24.2
.4	5.4	83.4	4.4	.3	5.3	84.5	4.6	.3	5.4	85.1	5.3	.4	6.2	87.1	6.4	.6	7.4	87.6	5.9	1.3	6.7
.02	3.1	.53	.01	.0	2.3	.53	.01	.0	2.4	.52	.01	.0	2.4	.52	.02	.0	3.0	.53	.01	.0	2.7
.03	3.9	.80	.04	.0	4.5	.80	.04	.0	5.5	.80	.04	.0	4.9	.79	.03	.0	3.2	.80	.03	.0	3.3
.04	5.1	.74	.04	.0	5.9	.74	.06	.0	7.6	.73	.05	.0	6.5	.74	.05	.0	6.4	.72	.05	.0	7.0
.14	10.6	1.40	.21	.0	14.7	1.44	.21	.0	14.4	1.53	.19	.0	12.6	1.67	.26	.0	15.6	1.73	.28	.0	16.2

TABLE 3

SUMMARY OF PHYSICAL MEASUREM

Age, years	7				8				9				10			
Number of cases	13				15				23				42			
Physical trait (measured in inches)	M.	S.D.	P.E. of S.D.	V.	M.	S.D.	P.E. of S.D.	V.	M.	S.D.	P.E. of S.D.	V.	M.	S.D.	P.E. of S.D.	V
Height—standing	47.5	1.7	.2	3.6	50.0	2.4	.3	4.7	52.3	2.4	.2	4.7	53.5	2.1	.2	
sitting	26.1	1.1	.2	4.4	26.9	1.1	.2	4.2	27.8	1.1	.1	3.8	28.2	1.1	.1	
stem length to vertex	25.8	1.2	.2	4.6	26.7	1.0	.1	3.8	27.6	1.1	.1	4.1	27.9	1.1	.1	
stem length to sternal notch	15.5	1.0	.1	6.6	16.5	.7	.1	4.7	16.9	.8	.1	4.7	17.1	.7	.0	
Head—diameter anterior-posterior	6.8	.2	.0	3.2	6.9	.2	.0	3.6	7.1	.3	.0	3.9	7.1	.2	.0	
diameter transverse	5.6	.2	.0	2.9	5.6	.1	.0	2.5	5.6	.1	.0	2.2	5.6	.2	.0	
height	5.1	.2	.0	3.6	5.0	.2	.0	3.4	5.1	.2	.0	4.4	5.1	.2	.0	
circumference	20.3	.5	.1	2.5	20.4	.4	.0	2.2	20.9	.6	.1	3.0	20.9	.5	.0	
face width	4.1	.3	.0	6.8	4.1	.2	.0	5.2	4.2	.2	.0	4.9	4.3	.1	.0	
face length	3.6	.2	.0	4.7	3.7	.2	.0	4.1	3.7	.2	.0	4.7	3.8	.2	.0	
Shoulders—width	10.7	.5	.1	4.6	11.3	.4	.0	3.6	11.7	.5	.0	4.2	11.8	.6	.0	
Arms—span	47.2	2.0	.3	4.2	48.7	2.8	.4	5.7	51.9	3.0	.3	5.8	53.0	2.2	.2	
shoulder-elbow left	9.8	.5	.1	5.3	10.4	.4	.0	4.2	11.1	.6	.1	5.7	11.5	.5	.0	
shoulder-elbow right	10.0	.5	.1	5.0	10.5	.5	.0	4.3	11.2	.6	.1	5.8	11.5	.6	.0	
elbow-finger tip left	12.3	.5	.1	4.1	13.0	.7	.1	5.5	13.9	.7	.1	5.3	14.2	.6	.0	
elbow-finger tip right	12.4	.6	.1	4.5	13.0	.7	.1	5.3	13.9	.7	.1	5.3	14.2	.6	.0	
upper arm circumference left	6.8	.5	.1	7.2	7.2	.4	.0	4.7	7.3	.5	.0	6.9	7.5	.7	.0	
upper arm circumference right	6.9	.5	.1	7.1	7.3	.3	.0	4.1	7.3	.5	.0	7.3	7.6	.7	.0	
upper arm flexed left	7.2	.6	.1	8.8	7.8	.3	.0	4.3	7.9	.5	.0	6.3	8.1	.8	.1	
upper arm flexed right	7.3	.6	.1	8.5	7.8	.4	.0	4.9	8.0	.7	.1	8.8	8.2	.8	.1	
wrist width proximal left	1.9	.1	.0	6.0	1.9	.1	.0	7.2	2.0	.1	.0	6.8	2.0	.1	.0	
wrist width proximal right	1.9	.1	.0	7.2	1.9	.2	.0	7.8	2.0	.2	.0	7.5	2.0	.2	.0	
wrist width distal left	1.6	.1	.0	6.5	1.7	.2	.0	9.2	1.8	.1	.0	6.3	1.8	.1	.0	
wrist width distal right	1.7	.1	.0	5.7	1.7	.1	.0	5.9	1.8	.1	.0	6.2	1.8	.1	.0	
wrist circumference left	5.0	.4	.0	7.1	5.2	.2	.0	4.8	5.4	.3	.0	5.5	5.5	.3	.0	
wrist circumference right	5.0	.4	.0	7.1	5.2	.2	.0	4.3	5.4	.3	.0	5.6	5.5	.3	.0	
Chest—width	7.2	.4	.0	5.1	7.6	.3	.0	3.4	8.0	.4	.0	5.3	8.1	.4	.0	
depth	5.4	.3	.0	5.7	5.6	.3	.0	5.2	5.7	.4	.0	6.4	5.9	.4	.0	
circumference	22.0	1.1	.2	5.0	23.0	.9	.1	3.9	24.0	1.0	.1	4.2	24.6	1.5	.1	
Hips—width ischia	7.9	.7	.1	8.3	8.3	.5	.1	6.1	8.6	.5	.0	6.2	8.9	.5	.0	
width trochanters	8.6	.6	.1	7.2	9.1	.4	.0	3.9	9.3	.5	.0	5.3	9.8	.6	.0	
circumference	25.4	1.9	.2	7.5	26.8	1.1	.2	4.2	27.3	1.6	.2	6.0	28.4	1.9	.2	
Leg—length	22.6	1.0	.1	4.3	24.2	1.6	.2	6.6	25.8	1.6	.2	6.3	27.1	1.5	.1	
Breathing capacity (cubic inches)	73.2	12.9	1.7	17.6	89.0	17.7	2.2	19.9	98.9	13.9	1.4	14.0	103.1	16.5	1.2	1
Grip—left (pounds)	21.9	5.1	.7	23.2	25.2	5.9	.8	23.6	31.0	6.6	.7	21.3	30.9	6.0	.4	1
right (pounds)	23.0	4.4	.7	19.2	27.6	5.4	.7	19.2	33.8	5.8	.6	17.1	35.3	5.5	.4	1
Weight, nude (pounds)	51.0	6.8	.9	13.3	58.5	5.9	.7	10.1	64.1	7.8	.8	12.1	69.4	9.5	.7	1
Cranial capacity (cubic inches)	73.6	4.6	.6	6.2	72.8	4.1	.5	5.6	74.6	6.3	.6	8.4	75.2	4.5	.3	
Indices—																
sitting-standing	.55	.01	.0	2.5	.54	.01	.0	2.2	.53	.01	.0	2.4	.53	.01	.0	
cephalic	.83	.02	.0	2.6	.82	.04	.0	4.4	.79	.03	.0	3.7	.80	.03	.0	
chest	.75	.04	.0	5.2	.73	.03	.0	3.8	.71	.05	.0	7.0	.73	.04	.0	
weight-height	1.07	.11	.0	10.4	1.17	.08	.0	7.2	1.22	.11	.0	9.3	1.29	.15	.0	1

11				12				13				14				15			
48				45				46				29				9			
M.	S.D.	P.E. of S.D.	V.	M.	S.D.	P.E. of S.D.	V.	M.	S.D.	P.E. of S.D.	V.	M.	S.D.	P.E. of S.D.	V.	M.	S.D.	P.E. of S.D.	V.
56.5	2.8	.2	4.9	58.0	3.0	.2	5.1	61.1	2.4	.2	3.9	62.3	1.9	.2	3.0	64.0	2.2	.4	3.4
29.6	1.3	.1	4.5	30.2	1.4	.1	4.5	32.1	1.4	.1	4.4	33.0	1.1	.1	3.4	33.8	1.1	.2	3.1
29.2	1.4	.1	4.7	29.9	1.4	.1	4.6	31.6	1.4	.1	4.5	32.7	1.0	.1	3.1	33.5	1.0	.2	3.1
15.1	1.0	.1	5.4	18.7	1.1	.1	5.9	19.9	1.0	.1	5.1	20.8	.8	.1	4.0	21.5	.7	.1	3.3
7.1	.2	.0	2.8	7.1	.2	.0	3.2	7.2	.2	.0	3.4	7.2	.2	.0	3.2	7.2	.2	.0	2.6
5.7	.2	.0	2.7	5.7	.2	.0	2.5	5.7	.2	.0	3.2	5.7	.2	.0	3.1	5.8	.1	.0	2.1
5.1	.2	.0	3.7	5.1	.2	.0	3.7	5.2	.2	.0	3.3	5.2	.2	.0	3.4	5.2	.2	.0	4.3
21.0	.5	.0	2.2	21.0	.6	.0	2.6	21.4	.6	.0	2.7	21.5	.6	.0	2.6	21.8	.6	.1	2.9
4.3	.2	.0	3.9	4.3	.2	.0	4.7	4.4	.2	.0	4.8	4.4	.2	.0	4.1	4.5	.2	.0	3.6
3.9	.2	.0	4.8	4.0	.2	.0	5.6	4.1	.2	.0	5.0	4.1	.2	.0	4.3	4.3	.2	.0	4.2
12.6	.7	.0	5.9	12.7	.7	.0	5.9	13.6	.8	.0	6.0	13.7	.7	.1	5.0	14.1	.7	.1	4.7
56.1	3.0	.2	5.4	58.1	3.1	.2	5.4	61.1	2.6	.2	4.2	62.0	2.4	.2	3.8	64.6	2.9	.5	4.5
12.0	.7	.0	5.6	12.4	.7	.0	5.8	13.3	.7	.0	5.2	13.4	.6	.0	4.5	13.7	.6	.1	4.6
12.2	.7	.0	5.4	12.6	.7	.0	5.5	13.2	.6	.0	4.9	13.5	.6	.0	4.3	13.8	.6	.1	4.4
14.9	.9	.1	6.0	15.5	.8	.0	5.3	16.3	.7	.0	4.7	16.5	.7	.1	4.0	17.2	.9	.2	5.1
15.0	.9	.1	6.1	15.5	.8	.1	5.4	16.3	.7	.0	4.7	16.3	.7	.1	4.5	17.2	.9	.2	5.2
8.0	.7	.0	9.5	8.1	.8	.0	10.0	8.7	1.1	.1	12.3	8.9	.8	.1	8.7	9.2	1.2	.2	12.9
8.1	.8	.0	9.6	8.1	.8	.0	9.9	8.7	1.1	.1	12.2	9.1	.8	.1	8.6	9.3	1.3	.2	14.0
8.6	.9	.1	10.7	8.8	.9	.1	10.1	9.4	1.1	.1	12.2	9.9	.8	.1	7.4	10.2	1.6	.2	15.4
8.8	.9	.1	10.4	8.9	.8	.1	9.4	9.6	1.1	.1	11.2	10.0	.8	.1	8.2	10.3	1.6	.3	15.7
2.2	.2	.0	7.2	2.2	.2	.0	6.9	2.2	.1	.0	5.9	2.3	.1	.0	5.1	2.4	.2	.0	8.2
2.2	.2	.0	7.1	2.2	.2	.0	7.4	2.3	.2	.0	6.1	2.3	.1	.0	4.7	2.4	.2	.0	7.7
1.9	.1	.0	6.3	1.9	.1	.0	6.2	2.0	.1	.0	5.7	2.0	.1	.0	4.1	2.1	.1	.0	5.8
1.9	.1	.0	6.4	2.0	.1	.0	6.3	2.0	.1	.0	6.2	2.1	.1	.0	3.9	2.1	.1	.0	4.2
5.8	.4	.0	6.5	5.9	.4	.0	6.1	6.2	.4	.0	5.4	6.2	.2	.0	3.8	6.3	.4	.0	5.2
5.8	.4	.0	6.4	5.9	.4	.0	5.7	6.2	.4	.0	5.4	6.2	.3	.0	4.9	6.3	.3	.0	5.2
8.5	.5	.0	6.0	8.6	.6	.0	6.2	9.3	.8	.0	8.7	9.5	.6	.0	6.1	10.0	.8	.1	8.4
6.1	.5	.0	8.7	6.3	.5	.0	8.0	6.9	.7	.0	9.8	7.0	.5	.0	7.0	7.5	1.1	.2	15.4
25.7	2.0	.2	7.9	26.7	1.8	.1	6.7	29.1	2.3	.2	8.0	29.8	1.8	.2	6.0	31.5	3.7	.6	11.7
9.4	.6	.0	6.7	9.7	.7	.0	6.9	10.4	.9	.1	8.4	10.7	.6	.0	5.6	11.4	1.0	.2	9.0
10.5	.8	.0	7.4	10.8	.7	.0	6.4	11.7	1.0	.1	8.4	12.3	.7	.0	5.3	13.0	.9	.2	6.8
30.2	2.6	.2	8.6	30.9	2.2	.2	7.0	33.8	3.3	.2	9.9	35.4	2.3	.2	6.5	36.3	2.8	.5	7.9
28.5	1.6	.1	5.6	29.2	1.7	.1	5.8	30.6	1.6	.1	5.2	30.9	1.5	.2	5.0	31.6	1.4	.2	4.4
115.6	18.8	1.3	16.3	127.9	18.2	1.3	14.3	155.6	25.6	1.8	16.5	162.8	22.1	.2	13.6	191.1	38.7	6.2	20.3
38.9	7.1	.5	18.2	42.3	8.6	.6	20.5	52.3	8.7	.6	16.7	56.0	8.5	.8	15.2	62.5	8.2	1.3	13.2
43.6	8.3	.6	19.0	46.7	9.3	.7	20.0	57.1	9.2	.6	16.0	61.7	8.0	.7	12.9	70.1	11.0	1.8	15.7
81.6	13.8	1.0	16.9	85.8	12.9	.9	15.0	104.3	20.4	1.4	19.5	112.0	16.6	1.5	14.9	125.5	28.5	4.5	22.7
77.5	4.5	.3	5.8	78.1	4.7	.3	6.0	81.9	5.0	.3	6.1	82.1	5.3	.5	6.5	82.9	6.4	1.0	7.7
.53	.01	.0	2.2	.52	.01	.0	2.2	.53	.01	.0	2.7	.53	.01	.0	2.4	.53	.01	.0	2.8
.80	.03	.0	4.2	.80	.03	.0	4.2	.79	.04	.0	4.7	.80	.03	.0	4.1	.81	.02	.0	2.9
.72	.05	.0	7.4	.74	.05	.0	6.6	.74	.05	.0	6.9	.73	.05	.0	6.3	.76	.05	.0	6.8
1.44	.21	.0	14.4	1.47	.20	.0	13.2	1.70	.29	.0	17.2	1.80	.21	.0	11.8	1.95	.41	.0	21.2

percentage in terms of a pure number, whereas the standard deviation involves various units of measurement. In the case of height at 7 years, for example, the average for the boys is 48.5 inches, while the standard deviation shows that about 68 per cent of cases vary not more than 2.4 inches on each side of this average. The coefficient of variability in height for the 7 year old boys is 5 per cent.

Since all measurements in tables 35 and 36 were accurately taken by a trained examiner under standardized conditions, and since the number of traits measured includes a comprehensive and significant selection, the results establish for the first time a series of averages for thirty-seven traits for a considerable number of mentally superior boys and girls. The less accurate measurements from one standpoint of technic of measuring are width of face, circumferences of arms, and circumference of chest.

Sex and age differences. A general survey of tables 35 and 36 and of figures 7 and 8 shows interesting and significant differences in sex development. The boys are superior to the girls in all traits up to 12 years of age, except width of hips, length of leg, and weight, in which the girls begin to show superiority before this age. It must be remembered, however, that these are averages of the measurements and that chronological age is an arbitrary division that does not take adequately into consideration the accelerated and retarded stages of anatomical and physiological ages for particular children. The writer's individual growth studies on large numbers of children show that tall children are farther advanced than short children in their periods of growth during childhood. This basic principle is also illustrated in a later section of this study (page 163 ff).

When 12 years of age is used as an arbitrary division, it is found that during the subsequent adolescent period the girls equal or excel the boys in standing height, sitting height, stem length to vertex, stem length to sternal notch, chest measurements, hip measurements, and weight. They maintain their superiority for the ages included.

Increments of growth. Figures 7 and 8 and tables 35 and 36 show an appreciable increase in increment of growth from age to age in practically all traits, except head measurements, with an adolescent acceleration beginning at about 13 years for the boys and 11 years for the girls, the ac-

FIGURE 7.
AGE CURVES FOR SIXTEEN PHYSICAL TRAITS—GIFTED BOYS

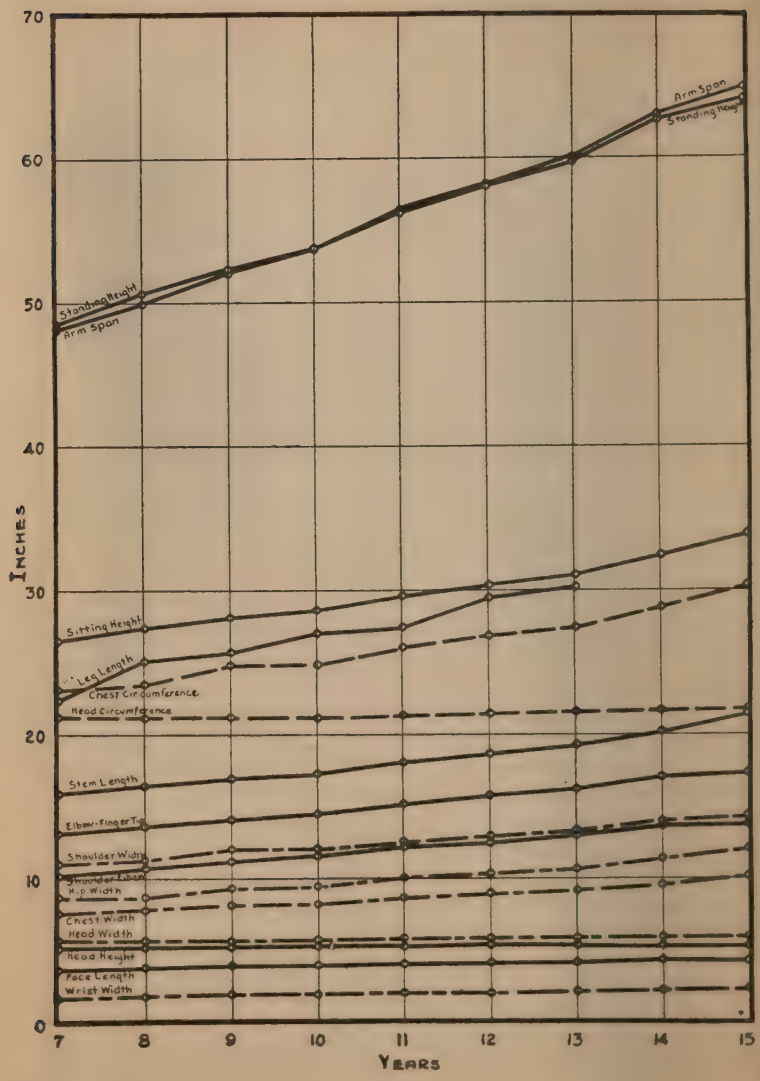
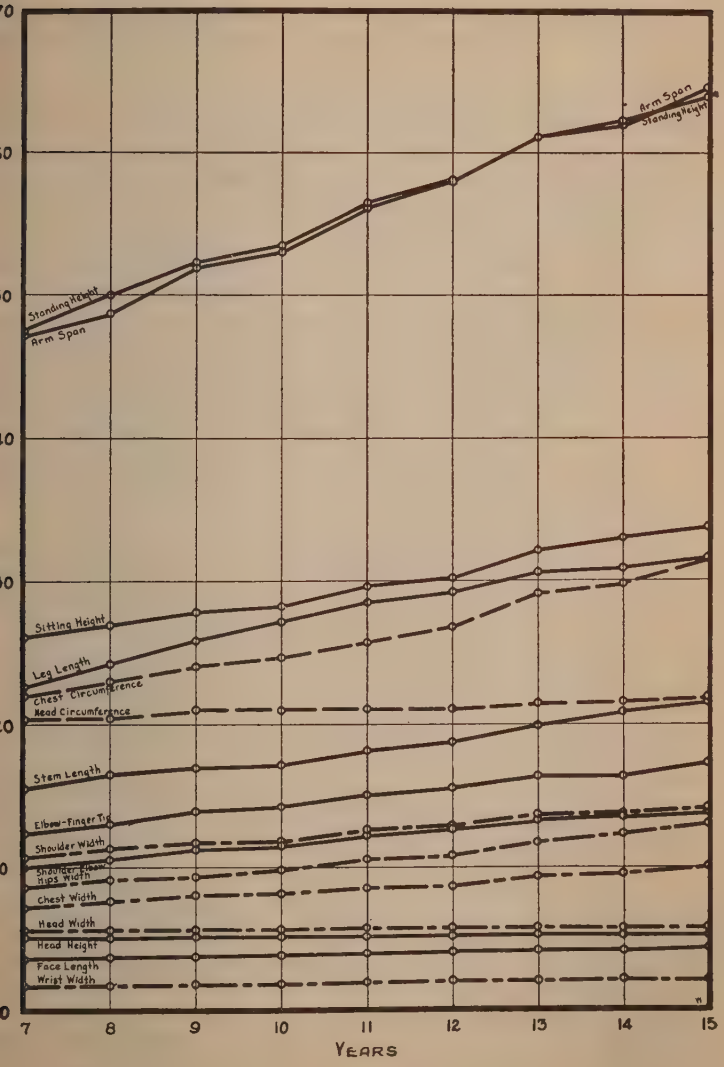


FIGURE 8.
AGE CURVES FOR SIXTEEN PHYSICAL TRAITS—GIFTED GIRLS



celeration varying with different traits. For instance, the acceleration in weight precedes the acceleration in height. The ages do not extend far enough to make possible a determination of the final status of growth in any one of the traits included.

Variability of measurements. A study of the lineal measurements, taken in terms of inches and tenths, shows that the least variable are those of the head (excluding the face), standing height, sitting height, stem length, width of shoulders, and width and depth of chest. The most variable lineal measurements are those of circumferences of the wrist, chest, and arms. Weight is from 2 to 3 times as variable as the lineal traits, and the psychophysical traits of breathing capacity and right and left grip show considerably more variability than weight.

A comparison of the coefficients of variability of all traits for all ages for the two sexes shows that, as a rule, the girls are more variable than the boys, and that the variability increases during the adolescent acceleration in growth. The percentage of variability differs for the sexes with the stages of physiological growth attained.

Indices of growth. The percentage of the weight to the height, that is, the weight-height index, varies with age and shows that the girls begin to increase in weight for their height after 12 years of age, and the boys slightly later. The individual indices vary with the relative increase in height, which also varies at a particular age with the height status of the child for each sex. The majority of these children are of normal weight for height, but several are decidedly underweight and others equally overweight.

The average cephalic indices are approximately the same for boys and girls and vary little with age.

The cranial capacity was computed for the children for ages 7 to 15 by the Pearson-Lee formula for general comparison with norms of Porteus[1] and others for Anglo-Saxon boys and girls. The results for the gifted children are above the Porteus norms throughout. The tabulated results are not included here because, as Professor Pearson writes in a recent letter, "to assume the formulæ hold for children, when the bone-growth (both internal and external) is so very consid-

[1]Berry, R. J. H., and Porteus, S. D.: Intelligence and Social Valuations. *Res. Publ. No. 20.* Training School, Vineland, May, 1920.

erable during the adolescent period, might lead to grave error." (Cranial capacities are now being computed from a larger series of head measurements on various children in the Iowa Child Welfare Research Station laboratory under Professor Pearson's directions.)

The average chest index varies little with sex or with age, except at 15 years of age, when the girls exceed the boys.

On the average, the sitting height is approximately 53 per cent of the standing height for boys and for girls of the ages included. Arm span and height are approximately equal, since the difference is less than 1 inch for both boys and girls at any age.

Comparison with control group. When a comparison is made with the Oak Park children, with whom the same instruments and methods of measuring were used, from the ages of 7 to 14 years in arm span, width of shoulders, width of hips, and right grip, it is evident that the gifted boys and girls as a group are superior in these four traits.

Coefficients of Correlation for Physical Traits

Zero order correlation. Table 37 gives the coefficients of correlation by the Pearson formula between four physical traits for the ages 9 to 14 inclusive and six additional physical traits for age 11, for boys and girls. The results show relatively high positive correlation between weight and standing height for all ages for both sexes, the correlation for the boys being higher than that for the girls.

The coefficients of correlation between breathing capacity and grip are also positive and relatively high for all ages for boys and girls, which means that for children of the same age, those of superior breathing capacity are also of superior strength, as indicated by grip of the right hand. At 11 years the coefficients of correlation between breathing capacity and width, depth, and circumference of chest are positive for boys and girls, but higher for boys than for girls. The results indicate that width of chest has a higher correlation with breathing capacity than either depth or circumference of chest.

These correlations indicate that for the various ages included the children who are relatively high in one physical trait are relatively high in the other physical traits.

TABLE 37.

COEFFICIENTS OF CORRELATION BETWEEN CERTAIN PHYSICAL TRAITS OF 594 GIFTED CHILDREN

	Pearson r by Age					
	9	10	11	12	13	14
Boys. Number at each age	(29)	(35)	(68)	(63)	(50)	(26)
Weight—standing height	.528 ±.092	.786 ±.044	.671 ±.045	.703 ±.044	.813 ±.032	.771 ±.055
Weight—width of shoulders	—	—	.779 ±.032	—	—	—
Weight—width of hips at ischium	—	—	.851 ±.023	—	—	—
Width of shoulders—width of wrist, proximal, right	—	—	.651 ±.048	—	—	—
Breathing capacity—width of chest	—	—	.494 ±.062	—	—	—
Breathing capacity—depth of chest	—	—	.454 ±.065	—	—	—
Breathing capacity—circumference of chest	—	—	.461 ±.065	—	—	—
Breathing capacity—right grip	.339 ±.111	.514 ±.084	.577 ±.055	.671 ±.047	.624 ±.058	.847 ±.038
Girls. Number at each age	(23)	(42)	(48)	(45)	(46)	(29)
Weight—standing height	.756 ±.060	.577 ±.069	.721 ±.047	.667 ±.056	.642 ±.058	.595 ±.081
Weight—width of shoulders	—	—	.653 ±.056	—	—	—
Weight—width of hips at ischium	—	—	.834 ±.030	—	—	—
Width of shoulders—width of wrist, proximal, right	—	—	.503 ±.074	—	—	—
Width of shoulders—width of hips at ischium	—	—	.552 ±.068	—	—	—
Breathing capacity—width of chest	—	—	.536 ±.069	—	—	—
Breathing capacity—depth of chest	—	—	.322 ±.087	—	—	—
Breathing capacity—circumference of chest	—	—	.489 ±.074	—	—	—
Breathing capacity—right grip	.457 ±.117	.530 ±.076	.596 ±.063	.513 ±.075	.564 ±.068	.488 ±.097

Partial correlations. By use of the partial correlation, age was made constant for this entire group. There is still a positive correlation between the physical traits included. For the boys, the lowest partial coefficient of correlation is +.483, between breathing capacity and depth of chest; the highest is +.703, between standing height and weight. For the girls, the lowest partial coefficient of correlation, +.466, is between breathing capacity and depth of chest; the highest, +.824, between breathing capacity and circumference of chest. These results show that when the effect of age is eliminated children who are superior in one physical trait are likely to be superior in other physical traits.

Comparison with control group. For control in the study of the correlation of physical traits of these gifted children, data on Horace Mann[1] and Oak Park[2] school children were used (Table 39). The Horace Mann group included 120 children for each age between 7 and 16 years, who had been measured without clothing consecutively each half year for periods of 6 to 10 years each. The Oak Park group included 122 children for each of the ages 11 and 14 years, measured with clothing. The three groups are of practically the same social status.

The coefficients of correlation between the various traits are as a rule higher for the Horace Mann children, who have had a long series of consecutive measurements. The correlations for the gifted children are about the same as those for the Oak Park children. The relative position of the three groups with respect to each other varies with the age, sex, and the trait measured. The low correlation between breathing capacity and right grip for the California children at 9 years of age may be due to the fact that the California children had not had previous training or experience with these two psychophysical tests.

This series of comparative coefficients of correlation shows that growth relationships for the traits included are very similar for the three groups of children. The boys of the three groups have as a rule higher coefficients of correlation than the girls.

[1]Baldwin, B. T.: *Physical Growth of Children from Birth to Maturity.* State University of Iowa, Iowa City. Studies in Child Welfare, 1921, I, 117–139.

[2]Reference is to unpublished data.

TABLE 38.

TOTAL AND PARTIAL CORRELATIONS BETWEEN CHRONOLOGICAL AGE AND PHYSICAL TRAITS OF 594 GIFTED CHILDREN

	Total Correlation		Partial Correlation with Age Constant	
	Boys	Girls	Boys	Girls
Chronological age—standing height	.845 ±.011	.894 ±.008	—	—
Chronological age—weight	.728 ±.018	.795 ±.015	—	—
Chronological age—width of chest	.692 ±.020	.800 ±.014	—	—
Chronological age—depth of chest	.618 ±.020	.697 ±.021	—	—
Chronological age—circumference of chest	.685 ±.020	.797 ±.015	—	—
Chronological age—breathing capacity	.742 ±.017	.822 ±.013	—	—
Chronological age—right grip	.762 ±.016	.827 ±.013	—	—
Standing height—weight	.873 ±.009	.866 ±.010	.703	.572
Breathing capacity—width of chest	.791 ±.014	.827 ±.013	.574	.495
Breathing capacity—depth of chest	.713 ±.019	.763 ±.017	.483	.466
Breathing capacity—circumference of chest	.800 ±.014	.824 ±.013	.600	.492
Breathing capacity—right grip	.971 ±.002	.849 ±.012	.934	.527

TABLE 39.

TOTAL COEFFICIENTS OF CORRELATION BETWEEN PHYSICAL TRAITS OF GIFTED AND OTHER GROUPS OF CHILDREN

Age	Group	Weight—standing height		Breathing capacity—right grip		Breathing capacity—circumference of chest	
		Boys	Girls	Boys	Girls	Boys	Girls
		r	r	r	r	r	r
9	Horace Mann	.876 ± .022	.638 ± .063	.523 ± .070	.377 ± .090	.643 ± .057	.419 ± .087
	California	.528 ± .092	.756 ± .060	.339 ± .111	.457 ± .117		
10	Horace Mann	.856 ± .024	.638 ± .056	.623 ± .055	.379 ± .081	.667 ± .050	.450 ± .075
	California	.786 ± .044	.577 ± .069	.514 ± .084	.530 ± .076		
11	Horace Mann	.853 ± .022	.581 ± .050	.535 ± .057	.584 ± .056	.650 ± .046	.473 ± .067
	Oak Park	.830 ± .022	.670 ± .043	.590 ± .049	.440 ± .064		
	California	.671 ± .045	.721 ± .047	.577 ± .055	.596 ± .063		.489 ± .074
12	Horace Mann	.782 ± .030	.693 ± .041	.527 ± .056	.419 ± .066	.732 ± .036	.506 ± .059
	California	.703 ± .044	.667 ± .056	.671 ± .047	.513 ± .075		
13	Horace Mann	.790 ± .029	.645 ± .047	.627 ± .047	.479 ± .062	.712 ± .038	.540 ± .057
	California	.813 ± .032	.642 ± .058	.624 ± .058	.564 ± .068		
14	Horace Mann	.877 ± .019	.666 ± .045	.663 ± .045	.429 ± .066	.715 ± .039	.492 ± .061
	Oak Park	.770 ± .035	.640 ± .059	.750 ± .038	.510 ± .074		
	California	.771 ± .055	.595 ± .081	.847 ± .028	.448 ± .097		

Resemblance Between Parents and Children

When the parents brought the children to the laboratories for measurement, the height and weight of the parents were taken in order to determine the correlation between the height of parents and the height of their children. In a few instances the fathers were measured at their homes. Table 40 gives the correlations of height of father and son and of mother and daughter for 305 children for the ages 10, 11, 12, and 13. The average of the four correlations for fathers and sons is .36; for mothers and daughters, .305.

Table 40.

Coefficients of Correlation Between Height of Parents and Height of 305 Gifted Children

	Age			
	10	11	12	13
No. of sons	25	49	42	37
r, fathers and sons	.439 ±.109	.289 ±.088	.213 ±.099	.501 ±.083
No. of daughters	36	40	38	38
r, mothers and daughters	.323 ±.101	.328 ±.095	.324 ±.098	.245 ±.103

Relation of Physical Growth to Nutritional Status

According to Dreyer's method[1] the normal weight of an individual is computed by finding the weight, in Dreyer's tables, corresponding to the subject's length of trunk and circumference of chest; the average of these two weights is the normal for the person of the given measurements.

$$\frac{\text{Weight derived from length of trunk} + \text{Weight derived from circumference of chest}}{2} = \text{normal weight.}$$

The percentage below or above normal is readily computed by comparing the observed weight and the normal weight derived from the tables.

$$\frac{(\text{Observed weight} - \text{calculated weight})\ 100}{\text{calculated weight}} = \text{per cent deviation.}$$

[1]Dreyer, G.: *The Assessment of Physical Fitness.* N. Y. Hoeber, 1921. p. 127.

Dreyer's standards of weight are:

Normal	within 5 per cent
Possibly abnormal	plus or minus 5 per cent
Probably abnormal	plus or minus 10 per cent
Certainly abnormal	plus or minus 15 per cent

An inspection of Table 41 shows that the Dreyer method of predicting weight on the basis of sitting height (stem

TABLE 41.

DISTRIBUTION OF GIFTED CHILDREN ACCORDING TO DREYER'S STANDARD OF WEIGHT

	Age									All Ages	
Boys	7	8	9	10	11	12	13	14	15	Number	Per cent
Weight, Per Cent Above Normal											
15 or more				1	9	4	3	1		18	6.21
10 to 14.9		1	2	6	13	11	8	7		48	16.55
5 to 9.9	1	1	10	12	23	15	20	8		90	31.03
0 to 4.9	3	4	10	8	12	19	14	5	2	77	26.55
Below Normal											
0 to 4.9	4	3	6	6	10	8	4	3	1	45	15.52
5 to 9.9	1	2		1	1	3		1	2	11	3.79
10 to 14.9											
15 or more	1									1	0.34
	9	12	28	34	68	60	49	25	5	290	99.99
Girls											
Weight, Per Cent Above Normal											
15 or more						2				2	0.74
10 to 14.9	1			2	2					5	1.84
5 to 9.9	2	3	2	6	3	1	1	1		19	6.99
0 to 4.9	6	7	7	12	13	6	3	1		55	20.22
Below Normal											
0 to 4.9	2	3	7	13	15	18	9	3	1	71	26.10
5 to 9.9	1	3	6	7	7	11	10	6		51	18.75
10 to 14.9	1		2	2	5	5	15	10	4	44	16.18
15 or more					3	3	8	8	3	25	9.19
	13	16	24	42	48	46	46	29	8	272	100.01

length) and chest circumference, gives a large percentage of overweight boys (35 per cent) and of underweight girls (54 per cent). Only 4 per cent of the boys are underweight and only 10 per cent of the girls are overweight, according to the Dreyer limits. When the limits of the Dreyer tables are extended to 10 per cent above and 10 per cent below his norm, 0.3 per cent of the boys and 25.4 per cent of the girls are underweight; 22.4 per cent of the boys and 2.6 per cent of the girls are overweight.

The Dreyer method should be elaborated to take into consideration age differences, sex differences, and differences of chest formation. Such an investigation is being carried out by the writer.

In order to formulate standards for evaluating the nutritional status of children, Von Pirquet[1] used as his index the *pelidisi*, which are based on the relationship between weight and sitting height. The formula is:

$$\frac{\sqrt[3]{10 \times \text{weight in grams}}}{\text{Sitting height in centimeters}} = 100 \text{ per cent}$$

Table 42 gives the pelidisi for the boys and girls included in this study. This table shows that the index for the boys taken as a group is 94 per cent and for the girls 95 per cent, with a range of 86 to 105 per cent for the boys and of 86 to 107 per cent for the girls. According to the Von Pirquet standards, the majority of these children range between 89 and 99 per cent with a standard deviation of more than 3 per cent, which would indicate that the normal rating should be a zone rather than a definite percentage.

For the 14 boys and 30 girls with pelidisi of 99 and above, all are above weight for height and age by the Baldwin-Wood tables. The average amount overweight for the boys is 34 per cent, for the girls 23.2 per cent. For the 5 boys and 6 girls below 89 in pelidisi, all are below weight for height and age. The average amount underweight for the boys is 11.5 per cent and for the girls 17.3 per cent.

[1]Pirquet, C. F., von: Sitzhöhe und Körpergewicht. *Ztsch. f. Kinderheil.*, 1916, XIV, 211–228.

TABLE 42.

VON PIRQUET'S PELIDISI OF GIFTED CHILDREN

Ages, years	Boys 7	8	9	10	11	12	13	14	15	All ages	Girls 7	8	9	10	11	12	13	14	15	All ages	Boys and Girls
Pelidisi, %																					
107																			1	1	1
106																1				1	1
105					1	2				3							1		1	2	5
104					1					1					1		1	2		4	5
103			1		1	1				3				1		1				2	5
102													1	1	1	1				4	4
101					2					2		1		2	1		4	1		9	11
100			1		1		1	2		5					2	1	4			7	12
99				1	2	2	1	3		9			1	2	4	5	1	3		16	25
98					1	2	4	1		8	1		2	1	3	3	4	3	1	18	26
97			1	4	5	2	7	2		21	1	2	2	4	2	2	3	2		18	39
96	1		1	3	3	5	4	3	1	21	1	1		7	8	3	2	2	1	25	46
95	1		5	6	6	3	5	4	1	31		3	2	6	4	3	7	1	1	27	58
94			3	3	17	12	12			47	1	1	4	5	4	5	3	2	1	26	73
93	4	2	4	2	6	12	7	3		40	1	3	2	2	4	11	2	5		30	70
92	2	3	7	3	4	7	4			25	3	2	3	5	4	2	3	3		25	60
91	1	1	1	4	10	9	4	3	2	35	1	2	2	1	2	3	3	1	1	16	51
90		6	3		5	2		2		18	3	1	4	1	3	2	5	1		20	38
89		2	1	3		2	1	2		11	1		1	3	3	2	1	2	1	14	25
88	1			1	1					3							2	1		3	6
87					1					1					1					1	2
86									1	1				1					1	2	3
	10	14	28	35	67	61	50	25	5	295	13	16	24	42	47	45	46	29	9	271	566
Mean Rating	92.60	90.79	93.54	93.37	94.21	93.95	94.58	94.68	91.80	93.84	92.62	94.06	93.75	94.83	94.89	95.00	95.30	95.07	95.67	94.76	94.23
S. D.	2.06	1.32	2.95	2.65	3.54	3.26	2.35	3.45	3.54	3.14	2.76	2.73	3.29	3.57	3.79	3.69	4.25	4.13	6.53	3.90	3.55
P.E. of S.D.	±0.31	±0.17	±0.27	±0.21	±0.21	±0.20	±0.16	±0.33	±0.76	±0.09	±0.37	±0.33	±0.32	±0.26	±0.26	±0.26	±0.30	±0.37	±1.04	±0.11	±0.07

Development of Carpal Bones

Roentgenograms[1] were available for 57 of the gifted children, 29 boys and 28 girls, from 9 to 12 years. The selection of children was made at random. The mean total areas of the carpal bones for these children are given in Table 43, with the mean areas for a group of Iowa children of the same ages.

Table 43.

Mean Area of Carpal Bones of 57 Gifted Children and 126 Iowa University School Children

	Gifted Group				Iowa Group		
Age	N	Area right sq. mm.	Area left sq. mm.	Age	N	Area right sq. mm.	Area left sq. mm.
Boys							
9	6	644	639	9	16	668	680
10	13	754	754	10	11	880	857
11	6	921	916	11	20	947	949
12	4	887	885	12	14	1166	1157
Girls							
9	1	775	756	9	17	801	791
10	17	819	821	10	10	798	787
11	9	967	962	11	20	1058	1036
12	1	718	704	12	18	1216	1216

From an examination of Table 43 it will be seen that the areas for the gifted children are lower at each age, except at 10 years for the girls, than for the Iowa group. This may be due to chance, since the numbers involved make a very inadequate sampling. It is necessary, therefore, to take account of the height of these children. Height measurements were available for 43 of the group, 22 boys and 21 girls, and for all the Iowa children. The average heights for ages show that the California gifted boys are shorter than the Iowa boys at 10, 11, and 12 years, and the California gifted girls shorter than the Iowa girls at 11 years.

While the difference between the two groups is partly explicable on the basis of differences in height, it cannot be wholly explained in this way.

[1]The roentgenograms were made by Dr. Moore. The measurements of the photographs were made under the direction of the writer.

Stages of Physiological Maturation

Observations were made on this group of children by the two examining physicians for some of the principal changes in both sexes during adolescence. (See page 577.) Five stages were indicated on the physical measurement cards to be followed by the examiners. These are (1) lack of apparent sex development; (2) beginning sex development, indicated by a slight appearance of straight pubic hair; (3) enlargement of genitals for boys and breasts for girls; (4) noticeable pigmentation and curl of pubic hair; (5) complete pubescence for boys and first menstruation for girls.

The progressive stages of physiological development necessarily grade into each other without sharp and accurate lines of demarcation. They are not capable of exact quantitative measurement like height in inches or weight in pounds. The correlations between the stages of physiological maturity and height, weight, width of hips, and circumference of chest of the gifted children have been calculated and are given in Table 44. It will be seen that all the correlations are positive and that probably all of them are significant. The highest correlations between physiological maturity and height are $+.529 \pm .077$ for girls at 12 years, and $+.498 \pm .072$ for boys at 13 years. The highest correlations between maturity and weight are $+.498 \pm .083$ for girls at 13 years, and $+.435 \pm .078$ for boys at 13 years. These correlations indicate that, for the given ages, the taller and heavier children are relatively more matured physiologically than the shorter, lighter children.

In order to determine to what extent the correlations were due to weight and to height, respectively, partial correlations were computed in order to determine the relation between physiological maturity and the physical measurements when the influence of weight and height are separately eliminated. These partial correlations are given in Table 45.

The significant correlations here are the correlation $+.411 \pm .088$ between physiological maturity and height, when the effect of weight is eliminated, for 12 year old girls; the correlation $+.264 \pm .090$ between maturity and height, when the effect of weight is eliminated, for 13 year

TABLE 44.

INTERCORRELATIONS BETWEEN FIVE STAGES OF PUBESCENCE (PHYSIOLOGICAL MATURITY), STANDING HEIGHT, WEIGHT, CIRCUMFERENCE OF CHEST, AND WIDTH OF HIPS FOR 290 GIFTED CHILDREN

Age	No.	Boys	Pearson r: Physiological Maturity		Standing Height	Weight	Width of Hips
		Standing Height	+.304	±.076	—	—	—
11	65	Weight	+.324	±.075	+.662	—	—
		Width of Hips	+.278	±.077	+.549	+.858	—
		Standing Height	+.373	±.077	—	—	—
12	57	Weight	+.305	±.080	+.705	—	—
		Width of Hips	+.339	±.079	+.677	+.860	—
		Standing Height	+.498	±.072	—	—	—
13	49	Weight	+.435	±.078	+.813	—	—
		Width of Hips	+.448	±.077	+.593	+.746	—
		Girls					
		Standing Height	+.360	±.090	—	—	—
11	42	Weight	+.422	±.086	+.708	—	—
		Width of Hips	+.271	±.096	+.630	+.840	—
		Circumference of Chest	+.470	±.081	+.571	+.894	+.760
		Standing Height	+.529	±.077	—	—	—
12	65	Weight	+.371	±.092	+.624	—	—
		Width of Hips	+.388	±.090	+.565	+.845	—
		Circumference of Chest	+.295	±.097	+.395	+.873	+.813
		Standing Height	+.291	±.101	—	—	—
13	37	Weight	+.498	±.083	+.725	—	—
		Width of Hips	+.426	±.091	+.678	+.866	—
		Circumference of Chest	+.428	±.090	+.651	+.950	+.790

old boys; and the correlation $+.437 \pm .090$ between maturity and weight, when the effect of height is eliminated, for 13 year old girls. On the basis of these partial correlations it may be concluded that the taller girls at 12 years are more mature physiologically than the shorter girls, that the taller boys at 13 years are more mature physiologically than the shorter boys, and that the more mature girls at 13 are heavier than the less mature.

TABLE 45.

PARTIAL CORRELATIONS BETWEEN FIVE STAGES OF PUBESCENCE (PHYSIOLOGICAL MATURITY) AND STANDING HEIGHT, WEIGHT, CIRCUMFERENCE OF CHEST, AND WIDTH OF HIPS FOR 290 GIFTED CHILDREN

Age	N	With Weight Constant	Partial Coefficients			With Height Constant	Partial Coefficients		
			Physiological Maturity	Standing Height	Width of Hips		Physiological Maturity	Standing Height	Width of Hips
Boys									
11	65	Standing Height	+.125	—	—	Weight	+.170	—	—
		Width of Hips	+.010	−.052	—	Width of Hips	+.144	+.729	—
12	57	Standing Height	+.224	—	—	Weight	+.064	—	—
		Width of Hips	+.144	+.195	—	Width of Hips	+.128	+.728	—
13	49	Standing Height	+.264	—	—	Weight	+.059	—	—
		Width of Hips	+.202	−.051	—	Width of Hips	+.219	+.565	—
Girls									
11	42	Standing Height	+.094	—	—	Weight	+.250	—	—
		Width of Hips	−.160	+.080	—	Width of Hips	+.061	+.718	—
		Circumference of Chest	+.240	−.190	+.040	Circumference of Chest	+.346	+.838	+.629
12	40	Standing Height	+.411	—	—	Weight	+.069	—	—
		Width of Hips	+.163	+.097	—	Width of Hips	+.123	+.763	—
		Circumference of Chest	−.044	−.362	+.269	Circumference of Chest	+.107	+.869	+.777
13	37	Standing Height	−.119	—	—	Weight	+.437	—	—
		Width of Hips	—	—	—	Width of Hips	+.326	+.738	—
		Circumference of Chest	−.130	−.188	−.261	Circumference of Chest	+.329	+.915	+.625

Nationality

Deviations of nationalities in height and weight. The boys and girls representing a preponderance of a particular nationality were selected, and the amount of deviation above or below the norm in height for age, and in weight for height and age was calculated. The results are shown in Table 46 for the seven predominating nationalities. The Jewish and Irish boys are the heaviest for their height and age and the American and Jewish girls are the heaviest for their height and age. The American girls include, however, two unusual cases of 34 and 60 pounds overweight, respectively.

Table 46.

Deviations from the Norms in Height and Weight of Gifted Children of Seven Predominating Nationalities

Nationality	Boys N	Boys Deviation Height Inches	Boys Deviation Weight Pounds	Girls N	Girls Deviation Height Inches	Girls Deviation Weight Pounds
American	11	—.22	+1.8	8	+.28	+11.8
English	43	+.01	—2.0	49	—.01	+1.8
German	41	—.11	+3.0	29	+.10	+1.9
Irish	14	—.78	+3.6	7	+.60	+0.1
Jewish	31	—.41	+7.2	23	—.30	+8.2
Scandinavian	6	—.90	—0.7	12	+.23	0.0
Scotch	12	—.08	+2.3	14	+.74	+0.8

Deviations of nationalities in cephalic index. The cephalic index is the proportion of the width of the head to the length. This index is frequently used by anthropologists for determining race classifications. The width varies from 70 to 90 per cent of the length for normal individuals. Within these limits three general divisions are indicated: (1) the long head, or dolicocephalic, below 75 per cent; (2) the broad head, or brachycephalic, ranging from 80 to 87 per cent; (3) the intermediate form, or mesocephalic, ranging from 75 to 80 per cent. It will be noted (Table 47) that all of these children lie in the upper range of the mesocephalic and the lower range of the brachycephalic, excepting the Scandinavian boys, who approach the extreme brachycephalic type.

For the American boys the indices range from 75 to 84 per cent, for the American girls, from 76 to 86 per cent; for

the English boys, from 71 to 88 per cent, for the English girls, from 74 to 87 per cent; for the Jewish boys, from 74 to 87 per cent, for the Jewish girls, from 73 to 89 per cent; for the Scandinavian boys, from 81 to 92 per cent, for the Scandinavian girls, from 75 to 85 per cent; for the Scotch boys, from 74 to 83 per cent (with one exception at 90), for the Scotch girls, from 71 to 81 per cent (with one exception at 85). This illustrates the fact that various types are found within a particular nationality. This is especially true of this group of children, where the classification is based on simply a preponderance of nationality.

TABLE 47.

AVERAGE CEPHALIC INDICES OF GIFTED CHILDREN OF THE SEVEN PREDOMINATING NATIONALITIES

Nationality	Cephalic Index							
	Boys				Girls			
	N	Mean	S. D.	P. E. of S. D.	N	Mean	S. D.	P. E. of S. D.
American	11	.80	.0256	±.0037	8	.81	.0361	±.0061
English	43	.79	.0368	±.0027	49	.81	.0335	±.0023
German	41	.80	.0285	±.0021	29	.81	.0325	±.0029
Irish	15	.80	.0304	±.0038	7	.80	.0334	±.0060
Jewish	31	.81	.0337	±.0029	23	.81	.0337	±.0033
Scandinavian	6	.86	.0389	±.0076	12	.80	.0292	±.0040
Scotch	12	.81	.0391	±.0054	13	.78	.0308	±.0041

MENTAL AND PHYSICAL STATUS

Since the mental examinations of these children were given prior to the physical measurements, the mental ages were computed to correspond with the exact chronological age at the time of the physical measurement, on the assumption that the IQ's for the short intervals remained constant.

In a study of the physical status of this group of gifted children, it is found that the group is, as a whole, physically superior to the various control groups used for comparison. In order to determine the exact amount of correspondence between mental superiority and physical superiority, it would be necessary to study a very large group of unselected children. This was not possible for this investigation. Tables 48 and 49 give the correlations that were calculated for the gifted group.

TABLE 48.

COEFFICIENTS OF CORRELATION BETWEEN MENTAL AGE AND HEIGHT AND WEIGHT OF 397 GIFTED CHILDREN

Boys	Age 10	11	12	13
N	35	68	63	50
Mental age-height,	r =.162 ±.111	.154 ±.080	.096 ±.084	.329 ±.085
N	35	67	61	50
Mental age-weight,	r =.437 ±.092	.043 ±.082	–.090 ±.086	.305 ±.087
Girls				
N	42	48	45	46
Mental age-height,	r =.148 ±.102	.340 ±.086	.076 ±.095	.043 ±.099
N	42	48	45	46
Mental age-weight,	r =.164 ±.101	.144 ±.095	–.055 ±.100	–.195 ±.096

TABLE 49.

TOTAL AND PARTIAL CORRELATION BETWEEN MENTAL AGE, CHRONOLOGICAL AGE, AND SEVEN PHYSICAL TRAITS OF 594 GIFTED CHILDREN

Boys Trait Pairs	Pearson coefficients		Coefficients with age constant	
Mental age—standing height	.835	±.012	.219	±.036
Mental age—weight	.697	±.020	.051	±.038
Mental age—width of chest	.662	±.022	.044	±.038
Mental age—depth of chest	.582	±.025	.002	±.038
Mental age—circumference of chest	.658	±.022	.052	±.038
Mental age—breathing capacity	.742	±.017	.168	±.037
Mental age—grip	.699	±.020	–.072	±.038
Mental age—chronological age	.941	±.004		
Girls				
Mental age—standing height	.876	±.009	.211	±.038
Mental age—weight	.745	±.018	.035	±.040
Mental age—width of chest	.773	±.016	.081	±.040
Mental age—depth of chest	.656	±.023	–.014	±.040
Mental age—circumference of chest	.756	±.017	.011	±.040
Mental age—breathing capacity	.792	±.015	.076	±.040
Mental age—grip	.766	±.017	–.090	±.040
Mental age—chronological age	.946	±.004		

The coefficients (Table 48) for weight and mental age for 10 year old boys, height and mental age for 11 year old girls, standing height and mental age, and weight and mental age for 13 year old boys indicate a positive relationship.

The correlations (Table 49) between mental age and standing height for the mentally superior boys and girls, independent of the effect of chronological age, are found to be $+.219 \pm .036$, and $+.211 \pm .038$, both of them probably significant correlations.

When the entire group is taken as a whole, and chronological age is partialled out, it is found that there is a slight positive correlation between mental age and standing height for boys and girls (Table 49), but none between mental age and the other physical measurements.

That a significant correlation between mental age and standing height is obtained for this selected group in which the IQ's range from 140 upward, indicates that the correlation would be much higher with a large unselected group in which the range of IQ's is wider. It is not possible to predict, from the data presented here, whether the amount of correspondence between superior physical measurements, other than standing height and weight, and superior mentality would be significant.

Summary and Conclusions

1. The gifted California children as a group are above the best standards for American born children in physical growth status for average standing height and weight. They also excel in average standing height and weight other groups of California children studied by Barnes, Boas, and Faber.

2. The gifted children deviate in a positive direction from the Baldwin weight-, height-, age-, breathing standards for American born children, but 62 to 73 per cent deviate not more than 10 per cent above or below these norms.

3. A large proportion have broad shoulders and hips, strong muscles, and well developed lungs.

4. In the 37 physical traits, the boys surpass the girls in the averages of all traits up to 12 years of age, except width of hips, length of legs, and weight, in which the girls begin to show superiority prior to this age. After 12 years the girls excel the boys in standing height, sitting height, stem length to sternal notch, chest measurements, hip measurements, and weight.

5. The physical traits of the girls are more variable than

those of the boys, with the coefficient of variability increasing slightly with age for both sexes. For boys and girls the least variable measurements are for head, standing height, sitting height, stem length, width of shoulders, and width of chest. The most variable are those of circumference of wrist, chest, and arms, weight, and the psychophysical functions of breathing capacity and strength.

6. These children excel the children of a control group in Oak Park, Illinois, in four selected physical traits, arm span, width of shoulders, width of hips, and grip.

7. Various types of cephalic indices are found within particular nationality groups represented by these children, but the majority of the children are of the mesocephalic type.

8. The coefficients of correlation between all of the physical traits are positive and high for each age and for each sex, ranging from .322 to .851. The coefficients are higher for boys than for girls.

9. When chronological age is made constant by means of partial correlations, the lowest coefficient for boys is .483, between breathing capacity and depth of chest, and the highest is .703, between standing height and weight. For girls the lowest coefficient is .466, between breathing capacity and depth of chest, and the highest is .824, between breathing capacity and circumference of chest.

10. There is positive correlation between the standing height of fathers and sons, and of mothers and daughters.

11. This group of children, measured by the Dreyer method of predicting weight, gives a large percentage of overweight boys and underweight girls according to the Baldwin-Wood norms; measured by the Von Pirquet nutritional rating, the majority of the children are grouped between 93 and 96.

12. The mean areas of the carpal bones of 57 of the boys and girls taken at random are found, by means of roentgenograms, to be slightly below the averages of Iowa children of the same ages.

13. All the coefficients of correlation between physical traits and stages of physiological maturity are significant for boys and girls of the ages 11, 12, and 13. The intercorrelations between the various physical traits are all high and

positive. This shows that taller, heavier, larger boys and girls mature earlier than smaller children of the same chronological age.

14. The coefficients of correlation between mental age and standing height and weight for ages 10 to 13 years vary considerably for boys and girls. Although low, they are positive for weight for 10 year old boys, for height for 11 year old girls, and for height and weight for 13 year old boys.

15. When age is made constant for the entire group of children from 2 years to 15 years of age by means of partial correlation, a small but probably significant positive correlation is found between mental age and height for boys and girls, but no correlation is found between mental age and other physical measurements.

16. The results of this investigation show that the gifted group is, as a whole, physically superior to the various groups used for comparison.

CHAPTER VIII

HEALTH AND PHYSICAL HISTORY[1]

This chapter will summarize data on health history for the main experimental group. The data came from three sources: (1) the Home Blank, (2) the School Blank, and (3) the history records of the physicians who gave the medical examinations. The data from all three sources relate to the main group of 643 children, but the subjects reported by the home, the school, and the medical examiners are not always identical. In each case the data were obtained for 90 per cent or more of the group, but the subjects for whom data were not available were not always the same. For practical purposes, however, the three kinds of data may be treated as three lines of evidence on the health conditions of a single group.

The items of information called for in the three blanks were not always the same, but (1) and (3) covered in general much the same ground. When a given question was included in both Home and School Blanks it was ordinarily worded identically in the two cases. The three schedules are as given below:

HOME BLANK (Part I)

I. PHYSICAL DATA

Did you keep a "baby book," or diary, of the child's early development?.....

1. Length of pregnancy (months child was carried).....Child's weight at birth.....
2. Exceptional conditions of birth (prolonged or severe labor, use of instruments, etc.) .....
3. Mother's health during this pregnancy.....
4. If child was breast-fed, from what age to what age?.....
   If child was bottle-fed, from what age to what age?.....
5. Describe child's health during the first year.....
6. First teeth appeared at about what age?.....First permanent teeth?.....
7. Age of learning to walk alone (several steps).....To talk (short sentences).....
8. (If girl) has menstruation begun?.....At what age?.....
   (If boy) Has voice changed?.....At what age?.....
9. Has child had adenoids?.....When?.....If removed, state when.....
10. Tonsil trouble?.....When?.....If tonsils removed, state when.....
11. Persistent mouth breathing (at present): none, slight, marked, extreme. (Underline)
12. Has child had colds very frequently, frequently, occasionally, only rarely? (Underline)

[1]Written with the assistance of Florence L. Goodenough, Dr. Albert H. Moore, and Dr. Edith Bronson.

13. Have eyes been tested?.....Nature of defect, if any.....Wears glasses?.....
14. Has child suffered from headaches?.....At what age?.....How often?.....
15. Is hearing excellent, good, fair, poor, very poor? (Underline)
16. Is nutrition apparently excellent, good, fair, poor? (Underline)
17. Has child had serious digestive trouble?.....At what age?.....How serious?.....
18. Symptoms of general weakness, if any.....
19. Is child especially nervous?.....How shown? .....
20. Chronic stuttering?.....From what age to what age?.....How severe?.....
21. St. Vitus' Dance?.....At what age?.....How severe?.....
22. Habitual muscular twitching?.....At what age?.....
Describe .....
23. Has child had marked fears?.....At what age.....Fears of what?.....
24. Has child had night terrors?.....At what age?.....How often?.....
Describe .....
25. Has child shown a marked tendency to worry?.....Over what?.....
26. Usual hour of going to sleep?.....Of waking?.....Is sleep sound?.....
Average length of time required to go to sleep?.....
27. What accidents, if any, has child had?.....
After-effects, if any.....
28. What surgical operations?.....Was recovery normal?.....
29. Illnesses: Write yes or no; give age, severity, and after-effects.

Diseases or illnesses	Yes or no	Age	Severity	Any lasting after-effects
Measles				
Mumps				
Whooping-cough				
Chicken-pox				
Scarlet-fever				
Diphtheria				
Other Diseases				

SCHOOL BLANK (Part I)

I. HEALTH

1. Does child have adenoids?.....Adenoids removed?.....
2. Are tonsils diseased?.....Tonsils removed?.....
3. Persistent tendency to mouth breathing (now): none, slight, marked, extreme. (Underline)
4. Has child colds frequently, occasionally, only rarely? (Underline)
5. Is vision (without glasses) normal, somewhat defective, very poor? (Underline)
Nature of defect, if any.....Does child wear glasses?.....
6. Does child have headaches frequently, occasionally, not at all? (Underline)
7. Is hearing normal, somewhat defective, very poor? (Underline)
8. Is nutrition apparently good, fair, poor? (Underline)
9. Symptoms of general weakness, if any.....
.....
10. Organic diseases (as of heart, kidneys, lungs, etc.).....
.....
.....
11. Is child especially nervous?.....Symptoms of nervousness, if any.....
.....
12. Does child stutter?.....How severely?.....
13. Has child had St. Vitus' Dance?.....Has child muscular twitchings?.....
14. Is child excessively timid?.....Prone to worry?.....Cause of worry?.....
15. Other indications of imperfect health.....
.....
16. Is above information based mainly on examination by a doctor?.....
Nurse's examination?.....Your own observations?.....
17. Does the school have a health examination record of this child?.....

Medical Blank (*History Section*)

Address ..... Tel. ..... Birth wt. .....

Family Father: alive ..... well ..... ill ..... tuberculosis ..... lues ..... chr. illness .....
dead ..... cause ..... date .....

Mother: alive ..... well ..... ill ..... tuberculosis ..... lues ..... chr. illness .....
dead ..... cause ..... date .....

Brothers: No. ..... alive ..... well ..... ill ..... dead .....

Sisters: No. ..... alive ..... well ..... ill ..... dead .....

No. mother's pregnancies .... Pt. is no. ..... Miscarriages { No. ..... at ..... mos.; ..... mos.; ..... mos.; } Induced ..... Spontan. .....

Insanity ..... Epilepsy ..... Asthma ..... Other .....

Feeblemindedness ..... Other nervous ..... Hayfever ..... hereditary .....

Remarks: .....

Prenatal .....

Birth History Full term ..... Birth .....

Premature: b. at ..... mos. ..... trauma .....

Remarks: .....

Infancy Asphyxia ..... Hemorrhage ..... Scurvy ..... Digestive .....

Cyanosis ..... Convulsions ..... Rickets ..... Malnutrition .....

Breast fed ..... mos. Bottle feeding ..... mos. Fresh milk ..... Vegetables

Cond. milk ..... began at .....

Age at which sat alone ..... First steps .....

cut first tooth ..... First words .....

Remarks: .....

Later History (*Give Dates*)

Specific Infections: Measles ..... Scarlet ..... Pneumonia ..... Other diseases .....

Pertussis ..... Diphtheria ..... Influenza ..... Complications .....

Sore throats ..... Otitis ..... Colds ..... Rheumatism ..... Toothache .....

Tonsilitis ..... Adenitis ..... Bronchitis ..... Chorea ..... Abscess .....

Loss of weight ..... Fever ..... Night cries ..... Exposure .....

Persistent cough ..... Night sweats ..... Growing pains ..... to Tbc

Digestive disturbance ..... Nervous disturbances ..... Urinary disturbances .....

Tonsillectomy 19 ..... Other operations ..... Fractures .....

Adenoidectomy 19 ..... Accidents .....

Sex Development ..... Pubic hair ..... Menstruation .....

Changes in voice ..... Masturbation .....

Remarks: .....

Habits Sleeps from ..... p. m. to ..... a. m. alone? ..... Day nap? ..... Out-of-doors .....

window open? ..... hrs. ..... hrs. daily .....

Bowels regular ..... Wets bed? ..... Brushes teeth ..... times daily

constipated ..... clothes? ..... Full bath ..... times weekly

Eats fast? ..... Milk, pints daily ..... Meat daily? .....

between meals? ..... Green vegetables daily? ..... Fresh fruit daily? .....

Tea ..... Candy ..... Approx. no. calories daily .....

Coffee .....

Remarks: .....

MEDICAL BLANK (*History Section*)

HABITUS Muscularly { strong.... weak .... Nervously { well-balanced..... irritable..... Habit unstable..... easily fatigued.... spasms...
Active..... Manageable..... Gets on with .....
Quiet..... Unruly..... other children
MENTALITY Age..... School grade..... Usual marks.....
Remarks: .....

(See page 216 ff for a statement regarding the examining physicians and regarding the conditions under which the examinations were made.)

Each of the above three sources of data has its advantages and disadvantages. Doubtless the medical history as recorded by the physicians is the most reliable, as it was obtained from the parent in person (usually the mother) at the time the child was brought for the medical examination. Information thus obtained is likely to be both fuller and more accurate than can be obtained by written replies. The information obtained from the Home Blank is usually from the same source as the history data reported by the physicians (the mother), but is less complete. In both cases the data are subject to the ordinary errors of report due to faults of memory and of observation. The coöperation of parents was such that it is believed the question of intentional falsification of report need not be raised. In judging the value of the information derived from parents it is necessary to take account of the superior intelligence and education of the families represented in our group, and the fact that in about 30 per cent of cases the parents had kept a written record in the form of a "baby book."

The School Blank was in nearly all cases filled out by the child's regular class teacher. The teacher's information is, of course, less complete than that of the parent, since it covers a briefer period; but for the same reason it is less likely to be vitiated by errors of memory. The teacher has also the advantage that she is likely to know more than the parent about the health conditions of the average child, which gives her a better standard for judgment. Moreover, she is able in many cases to refer to records of school health examinations made by school doctor or school nurse. Finally, the circumstance which makes the school reports of special

interest is the fact that comparable reports were obtained from teachers for a control group, as well as for the gifted group. The sources of the teacher's information in the case of the gifted and the control groups were as follows:

Main Source of Information	Gifted	Control
School doctor	8.4%	9.6%
Doctor and nurse	1.2%	2.2%
Doctor and teacher	7.3%	9.0%
Nurse	13.3%	7.2%
Nurse and teacher	16.4%	15.8%
Doctor, nurse, and teacher	4.6%	8.3%
Teacher (sometimes includes observation of parents)	48.8%	47.9%
School has health record for	75.4%	79.4%

The control children attended the same schools as the gifted attended and usually, but not always, the same class. This means that in a majority of cases the School Blank for a control subject was filled out by a teacher who had filled one for a gifted subject. Effort was made to secure a control group which would represent as fairly as possible the entire school population of grades 2 to 8. The choice was made on an arbitrary and objective basis. In each case the teacher was directed to select that child in the class whose chronological age was nearest to the age-grade norm according to the following standards:

Grade 2	7	years	9	months
" 3	8	"	10	"
" 4	9	"	11	"
" 5	11	"	0	"
" 6	12	"	1	"
" 7	13	"	2	"
" 8	14	"	3	"

The above standards correspond very closely to the actual grade medians for the school population in the cities covered.

Approximately 800 teachers, distributed fairly evenly in the schools which were canvassed after January 1, 1922, were asked to fill out the School Blanks for control subjects, one each. Approximately 600 did so with the necessary promptness, and the number of blanks filled out with sufficient completeness to make them usable was 527. These were distributed by age and sex as follows:

Age	Boys	Girls
8	45	36
9	38	43
10	38	42
11	39	35
12	36	35
13	38	33
14	33	36
Total	267	260
Grand total	527	

As other control groups were used for other purposes, this one will be referred to as Control Group A.

Length of Pregnancy

Verbal report of mothers to physicians for 591 children of main experimental group gave the following results:

	Premature	Full Term	Overtime
Of 317 boys	3.5%	94.9%	1.6%
Of 274 girls	5.5%	94.2%	0.4%
Sexes combined	4.4%	94.6%	1.0%

The 26 cases of premature birth were distributed as follows:

	6½ mos.	7 mos.	7½ mos.	8 mos.	8½ mos.	8¾ mos.	Total
Boys		1		7	2	1	11
Girls	1	2	1	4	7		15

Length of pregnancy was reported in the Home Blank for 565 children of the same group. Data from this source gave 3.7 per cent of births as premature (not over 8 calendar months) and 1.4 per cent as overtime (10 calendar months). These figures agree closely with those based upon verbal reports to the physicians.

Mother's Health During Pregnancy

Data are available only from the Home Blanks on this point. The following summary of responses is given for whatever it may be worth:

	N	"Excellent"	"Good"	"Fair"	"Poor"	"Very Poor"
Boys	320	30%	49%	13%	6%	2%
Girls	254	35%	46%	11%	4%	4%

There were 44 conditions of ill health reported in the Home Blank, including 9 cases of "nervousness" and 7 cases of "nausea." No other condition was reported more than three times.

Weight at Birth

Birth weight was reported in the Home Blank for 569 children, exclusive of those prematurely born. The distributions are as follows, taking weight in each case to nearest half pound:

	N	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10
Boys	317	0	2	1	19	10	27	51	48	38	39	26	30
				10½	11	11½	12	12½	13	13½	14	14½	15
				8	11	2	4		1				

	N	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10
Girls	252	1	3	3	10	18	34	33	46	32	28	12	16
				10½	11	11½	12	12½	13	13½	14	14½	15
				6	7		2						1

	Median	Mean	S. D.
Boys	8 lbs., 3.10 oz.	8 lbs., 6.26 oz.	1 lb., 5.96 oz.
Girls	7 lbs., 15.20 oz.	8 lbs., 1.74 oz.	1 lb., 6.22 oz.

There were 64 boys and 57 girls reported to the physicians whose birth weights were the result of hospital weighings. These gave for the boys a mean of 8 lbs., 5.2 oz. (S.D. 1 lb., 7 oz.), and for the girls a mean of 7 lbs., 12 oz. (S.D. 1 lb., 2 oz). The means for the hospital weighings are only a very little lower than those based on the reports in the Home Blank, but the variability of the former is considerably lower. It is probable that the hospital records are the more reliable, but it should be noted that in both cases errors of memory may have entered. However, there are 140 boys and 68 girls for whom parents had kept written records (chiefly of home weighings). These gave the following results:

	N	Median	Mean	S. D.
Boys	140	8 lbs., 9.8 oz.	8 lbs., 5.4 oz.	1 lb., 6.02 oz.
Girls	68	8 lbs., 3.4 oz.	8 lbs., 3.4 oz.	1 lb., 6.18 oz.

Both median and mean are higher for this group than for either of the other groups. For all the groups they are sig-

nificantly higher than the norm, as will be seen from the following comparative data:

	Mean, boys	Mean, girls
[1]Faber, 644 hospital cases	7 lbs., 11 oz.	7 lbs., 5 oz.
[2]Holt	7 " 8.8 "	7 " 2.6 "
[3]Pearson, 1000 consecutive hospital births	7 " 4.8 "	7 " 1.8 "
[4]Bowditch, Eastern United States	7 " 8.8 "	7 " 3.7 "
[5]Brit. Anthropometric Commission, 1000 cases	7 " 1.6 "	6 " 14.6 "
[6]Skelheway and Gilbert, 500 South Australian infants of British descent	7 " 15.3 "	7 " 9.2 "
[7]L. S. Hollingworth, N. Y. hospital cases	7 " 6.4 "	7 " 1.6 "

The mean birthweights furnished by Dr. Faber are of special interest for our present purpose for the reason that they are based upon San Francisco infants. Although these means are higher than most other investigators have found, they are still far below the means for the gifted group.

It may be of interest to compare the average of the four means for American children reported by Faber, Holt, Bowditch, and Hollingworth with the average of the means for the three separate gifted groups (total reported in Home Blank, cases reported in Home Blank for whom a "baby book" was kept, and cases of hospital weighings reported to physicians):

	Mean, Boys	Mean, Girls
Average of Faber, Holt, Bowditch and Hollingworth	7 lbs., 8.75 oz.	7 lbs., 3.22 oz.
Average of three gifted groups	8 " 5.6 "	8 " 0.4 "
Excess of gifted over the norms	13.6 "	13.8 "
Excess in per cent	11.3%	12.0%

[1]Harold K. Faber: A Study of the Growth of Infants in San Francisco with a New Form of Weight Chart. *Archives of Pediatrics*, April, 1920.

[2]Holt: *Care and Feeding of Children*, Appleton & Co., 1912.

[3]Karl Pearson: Data for the Problem of Evolution in Man. *Proc. of the Royal Society of London*, Vol. 66, p. 23, 1900.

[4]Bowditch, H. P.: *Eighth Annual Report*, State Board of Health, Massachusetts, 1877.

[5]Report of the British Association for the Advancement of Science, 1883, p. 253.

[6]Robertson, T. B.: *Comparison of the Weights at Birth of British Infants*. University of Calif. Press, 1915.

[7]Hollingworth, L. S.: Comparative Variability of the Sexes at Birth. *Amer. Journal of Sociology*, Vol. 20, p. 335.

The superiority of the gifted is about three-fifths of the standard deviation of the gifted. It is conceivable that some of this superiority may be due to a tendency for birth weights to be exaggerated in memory reports, but if this were the explanation, the mean should be lower for children for whom written records were kept. Such was not the case. The evidence seems to justify the conclusion that our gifted children are above the norm with respect to weight at birth.

Abnormal or Unusual Conditions of Birth

The physicians obtained information on this point for 591 children of the main group. In the Home Blank 536 of the same group were reported on by parents. The data from the two sources agreed very closely, but as the verbal reports made to the physicians are doubtless the more accurate, these only are presented. It will be noted (Table 49a) that 19 per cent of the births of males, and 12 per cent of the births of females, involved instrumental delivery. Such figures would suggest that the common belief regarding the influence of this factor in the causation of mental defect may not be well founded.

Table 49a.

Conditions of Birth

	Of 317 Boys	Of 274 Girls
Instrumental delivery	60 (or 19%)	33 (or 12%)
Induced labor	—	2
Prolonged labor (48–72 hrs.)	—	2
Foot presentation	1	—
Breech presentation	4	5
Caesarian section	—	3
Vaginal caesarian	1	—
Twilight sleep	1	2
Left arm broken	1	—
Cord about neck	1	—
Congenital hip dislocation	1	—
Badly bruised	23	16
Hematoma	1	1
Angioma	—	1
Paralyzed (12 hrs.)	1	—
Scar left by instruments	1	—
Total conditions	96	65
More than one condition listed	33	21
Total cases unusual or abnormal	63 (or 19.9%)	44 (or 16.0%)

Infant Feeding

The data summarized are for 589 cases reported in the Home Blank. The results are given separately for the nationality groups: (1) American, including all American born mothers except those of Jewish ancestry; (2) foreign born, including Canadians but excluding all of Jewish ancestry; (3) mothers of Jewish or partly Jewish ancestry. This group includes a few mothers who have not reported their ancestry as Jewish but who are believed to be of Jewish origin. The most important facts are given in Table 50.

Table 50.

Infant Feeding

	Amer. born, non-Jewish (N=428)	For. born, non-Jewish (N=68)	Jewish (N=93)	Total (N=589)	All of 160 IQ or above (N=88)
1. Breast fed only, entire period	44.2%	64.7%	50.5%	47.5%	57.8%
2. Bottle fed only, entire period	8.9%	4.4%	7.5%	8.2%	4.4%
3. Partly breast, partly bottle	46.3%	29.4%	40.1%	43.5%	37.8%
4. Report not clear	0.8%	1.5%	1.1%	0.8%	0.0%
5. Breast only, eight months or longer	50.0%	60.3%	58.1%	52.5%	55.6%
6. Breast only for less than eight months	40.4%	33.9%	33.3%	38.5%	40.0%

The proportion of breast feeding is probably high for the social classes represented in this group. It is highest in the foreign born non-Jewish, next highest in the Jewish, and lowest in the American born non-Jewish. The figures of the last column, for cases 160 IQ or over, show a slightly but perhaps not significantly higher percentage of breast feeding than is found for the total group. The low percentage of bottle feeding might be interpreted either as an indication that bottle feeding is not favorable to superior mental development, or that these parents have, because of their own intelligence, recognized the importance of breast feeding. The latter is probably sufficient to account for all the difference found.

Valuable comparative data on the proportion of infants who are breast fed are given for 20,504 cases by Woodbury.[1] Table 51 shows the per cent of Woodbury's cases and of our gifted cases that were breast fed for various periods. In the preparation of this table infants which were "partially breast fed" are included but given only half weight. For this reason the figures for the gifted do not exactly tally with those in Table 50. Woodbury's data are confined to children who lived twelve months or longer.

TABLE 51.

PERCENTAGE OF BREAST FEEDING AMONG UNSELECTED AND GIFTED CHILDREN

	Unselected (Woodbury)	Gifted (Stanford Group)
Breast fed 1 month or longer	90.1%	92.4%
" " 2 " " "	81.6%	89.2%
" " 3 " " "	75.8%	83.9%
" " 4 " " "	69.1%	77.5%
" " 5 " " "	65.4%	73.8%
" " 6 " " "	61.6%	68.0%
" " 7 " " "	55.0%	61.4%
" " 8 " " "	51.0%	57.4%
" " 9 " " "	46.7%	54.2%
" " 10 " " "	41.4%	47.6%
" " 11 " " "	37.9%	41.3%
" " 12 " " "	35.6%	34.7%

The above figures show a considerably higher percentage of breast feeding for the gifted. It should be noted, moreover, that Woodbury's data were obtained in industrial cities[2] in which there was a large proportion of foreign born. In fact, 21.2 per cent of Woodbury's mothers are so classified. Since the percentage of breast feeding is higher in the case of foreign born than of native born mothers (both in Woodbury's data and our own), the superiority of our gifted is even greater than the above figures would indicate.

Table 52 gives additional comparative data. The figures from Dietrich are based upon 1,000 consecutive cases

[1]Robert M. Woodbury: The Relation between Breast and Artificial Feeding and Infant Mortality. *Amer. J. of Hygiene*, Vol. 2, November, 1922, pp. 668–687.

[2]Johnstown, Pa.; Manchester, N. H.; Saginaw, Mich.; New Bedford, Mass.; Brockton, Mass.; Waterbury, Conn.; Akron, Ohio, and Baltimore, Md.

seen in private practice in Los Angeles, including no hospital or welfare cases. Dietrich does not state whether the 83 cases in which breast feeding was supplemented by the bottle were included in the totals for breast fed. Mitchell's figures are based upon nearly 3000 cases in a children's hospital for the years 1900 to 1915. The cases were not consecutive and the method of selection is not given. The fact that this was a hospital group would make it of doubtful value for comparative purposes.[1]

TABLE 52.

ADDITIONAL COMPARATIVE DATA ON INFANT FEEDING

	Dietrich	Mitchell	Gifted
Breast fed 1 month or longer	84.9%	---	92.4%
" " 2 " " "	78.2%	65.3%	89.2%
" " 3 " " "	70.8%	54.8%	83.9%
" " 4 " " "	61.8%	47.9%	77.5%
" " 5 " " "	55.6%	44.8%	73.8%
" " 6 " " "	51.5%	42.1%	68.0%
" " 7 " " "	44.4%	38.3%	61.4%
" " 8 " " "	39.2%	36.4%	57.4%
" " 9 " " "	—	33.9%	54.2%
" " 10 " " "	—	31.2%	47.6%
" " 11 " " "	—	29.3%	41.3%
" " 12 " " "	—	27.4%	34.7%

The superiority of the feeding conditions for the gifted group is even more marked in Table 52 than in Table 51. Perhaps the figures from Dietrich are the most valuable of all for our present purposes, since they are consecutive cases found in private practice among the middle classes of one of the cities covered in our survey. Only 39.2 per cent of his cases, as compared with 57.4 per cent of the gifted, were breast fed eight months or longer.

EARLY HEALTH

The physicians report the following abnormal conditions during infancy:

[1]Henry Dietrich, M.D.: An Analysis of a Series of Case Records Relative to Certain Phases of Breast Feeding. *J. of Amer. Med. Ass'n.*, July 22, 1922.
Graeme Mitchell, M.D.: The Duration of the Nursing Period in Women of the United States. *J. of Amer. Med. Ass'n.*, May 27, 1916.

	Dr. Moore		Dr. Bronson	
	139 boys	142 girls	178 boys	132 girls
Asphyxia	5	4	7	2
Cyanosis	6	6	5	3
Hemorrhage	0	1	0	0
Convulsions	5	1	2	3
Scurvy	0	1	2	0
Rickets*	0	0	9	0
Digestive*	8	8	28	23
Malnutrition	8	8	10	10
Total	32	29	63	41

Two conditions reported for 39 children.
Three " " " 8 "
Four " " " 1 child.

* A subjective difference between the reports of the two physicians probably exists here. In the positive findings recorded in the medical blank, Dr. Moore reports several cases as "suggestive of early rickets." (See report on deformities of head and chest, pp. 224 and 233.) These cases, however, are checked under *rickets* as normal and therefore are not included in the above table.

Of a total of 591 cases, 107 (or 18.1 per cent) suffered from one or more of the above conditions.

In the Home Blank parents rated "health during the first year" as shown in Table 53.

TABLE 53.

HEALTH DURING FIRST YEAR (HOME BLANK)

	N	1 Excellent	2 Good	3 Fair	4 Poor	5 Very Poor	Median
Boys	317	25.6%	44.5%	12.3%	13.2%	4.4%	2.1*
Girls	254	29.9%	49.2%	5.5%	13.4%	2.0%	1.9*
Total	571	27.5%	46.6%	9.3%	13.3%	3.3%	2.0†

* Equivalent of good. † Good.

Slightly more than half of the special conditions of ill health during the first year reported by the mothers were digestive disorders.

EARLY DEVELOPMENT

Table 54 summarizes the testimony of mothers to physicians at the time of the medical examination with respect to age of sitting alone, teething, first steps, and first words ("at least three"). The data are subject to the usual vitiation from faulty memory and from lack of uniform meanings attached to such expressions as "sitting alone,"

"first steps," etc. The very early records are especially questionable, and for this reason the medians are probably more significant than the means.

Below Table 54 are given for comparison the means, medians, and S.D's based upon reports made by parents in the Home Blank. Attention is called to the fact that the data from medical blanks and Home Blanks are not comparable on age of walking and talking, as the terms were, unfortunately, differently defined in the two cases.

TABLE 54.

DATA ON EARLY DEVELOPMENT
(Total for both physicians)

Months	Sat alone		First tooth		First steps		First words ("At least three")	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
3	4	6	5	13	—	—	—	—
4	22	29	23	14	—	—	1	—
5	57	39	34	42	—	—	2	1
6	81	77	54	45	—	—	2	5
7	30	27	65	56	1	1	5	5
8	11	8	34	25	1	4	14	10
9	12	5	28	18	15	12	20	36
10	1	2	17	10	13	14	43	43
11	1	—	7	9	36	32	37	44
12	—	1	9	6	68	58	76	67
13	—	—	4	4	44	50	25	8
14	1	—	2	2	49	44	12	8
15	—	1	—	2	31	20	4	3
16	—	1	1	—	14	12	5	2
17	—	—	—	—	7	4	2	0
18	—	—	—	—	14	6	11	8
19	—	—	—	—	1	2	—	—
20	—	—	—	—	3	—	—	—
21	—	—	—	—	—	—	—	—
22	—	—	—	—	1	4	—	—
23	—	—	—	—	—	—	—	—
24	—	—	—	1	2	1	2	1
Above 24	—	—	—	—	1	—	2	—
Unknown	97	78	34	27	16	10	54	33
Mean	5.96	5.88	7.18	7.02	13.10	12.87	11.74	11.01
Median	5.83	5.81	6.89	6.67	12.87	12.72	11.60	10.74
S. D.	1.46	1.70	2.25	2.42	2.63	2.46	3.38	2.37
Home Blank	(Not reported)		N=292	N=232	"Several steps" N=310	N=255	"Short sentences" N=259	N=195
Mean	—	—	7.83	7.70	14.16	14.08	17.82	17.05
Median	—	—	7.42	7.23	13.84	13.78	18.03	15.83
S. D.	—	—	2.43	2.55	2.97	2.83	5.21	4.29

Mead[1] reports the following data on age of walking and talking for normal and feeble-minded children:

	Walking			Talking		
	N	Mean	A. D.	N	Mean	A. D.
Normal	50	13.88 mos.	1.56 mos.	50	15.32 mos.	3.0 mos.
Feeble-minded	144	25.08 "	9.6 "	92	38.52 "	16.8 "

Comparison of means shows that our gifted children walked about one month earlier and talked about three and a half months earlier than Mead's normal children. Mead's data were based on the following definitions:

Walking means "to take a step unassisted."
Talking means "to use a word intelligently; i.e., to associate the idea with the object."

The data for our gifted group show the girls slightly more precocious than the boys in sitting alone, teething, walking, and talking. In all cases, however, the difference is very small in comparison with the S.D. The coefficients of variation, by the formula

$$V = \frac{\text{S.D.} \times 100}{\text{Mean}}$$

are as follows (for physicians' data):

	Sat alone	First tooth	First steps	First words
Boys	24.5	31.3	20.1	28.8
Girls	28.9	34.5	19.1	21.5

That is, the girls are more variable in two of the traits, and the boys in two.

Disease History

The most important data on this point are those of Table 55, which is based upon the section of the medical examination blank entitled "later history."

[1] C. D. Mead: *The Relation of General Intelligence to Certain Mental and Physical Traits.* Teachers' College, 1916, p. 117.

TABLE 55.

PARTIAL SUMMARY OF DISEASE HISTORY

(Medical Examinations)

	Boys		Girls		Totals
	Dr. Moore	Dr. Bronson	Dr. Moore	Dr. Bronson	Both physicia
Sore throat	113(81.9%)	100(56.2%)	117(81.8%)	88(66.7%)	418(70.7%
Tonsilitis	96(69.6%)	83(46.6%)	102(71.3%)	79(59.8%)	360(46.1%
Otitis	35(25.4%)	45(25.3%)	30(21.0%)	36(27.3%)	146(24.7%
Adenitis	27(19.6%)	18(10.1%)	12(8.4%)	9(6.8%)	66(11.1%
Colds	126(91.3%)	122(68.5%)	128(89.5%)	79(59.8%)	455(76.9%
Bronchitis	14(10.1%)	40(22.5%)	11(7.7%)	22(16.7%)	87(14.7%
Rheumatism	1(0.7%)	1(0.6%)	4(2.8%)	6(4.5%)	12(2.0%
Chorea*	0 —	0 —	1(0.7%)	0 —	1(0.2%
Toothache	15(10.9%)	47(26.4%)	13(9.1%)	55(26.5%)	110(18.6%
Abscess	2(1.4%)	24(13.5%)	0 —	26(12.1%)	52(8.8%

* One additional case of chorea was reported in the Home Blank. Both cases have entirely recovered.

The total number of positive reports in the above table is 1,697. There were one or more positive reports for 550 of the 591 children of the main group who were given medical examinations. This is an average of somewhat more than three for each child. Reports of two or more illnesses were made as follows:

	Two	Three	Four	Five	Six	Seven
Boys, Dr. Moore	19	45	38	12	4	1
Boys, Dr. Bronson	35	36	39	16	5	1
Girls, Dr. Moore	20	71	24	8	2	1
Girls, Dr. Bronson	21	24	24	22	4	–

Table 55 shows the large effect of subjective factors entering into medical statistics. Dr. Moore reports about a third more cases of sore throat, tonsilitis, adenitis, and colds than Dr. Bronson. That this difference is probably not due to climate or to hereditary tendencies in the population attracted to Los Angeles is suggested by the fact that Dr. Bronson reports bronchitis, another disease of the respiratory tract, more than twice as often as Dr. Moore. Dr. Bronson reports toothache nearly three times as frequently as Dr. Moore, and she reports 50 of the 52 cases of abscess. The disagreements are due in part to the greater tendency of Dr. Moore to ignore minor departures from perfect health, and in part to the fact that Dr. Bronson questioned the mothers somewhat more extensively than did Dr. Moore.

Table 56 summarizes the data of the physicians on certain symptoms which are likely to be associated with tuberculosis.[1] For all the symptoms in this group the figures of Dr. Moore are higher than those of Dr. Bronson. It is very probable that this is due to the fact that Los Angeles attracts so many families in which there is low resistance to tuberculosis. The large figures for "growing pains" and "night cries" suggest that these symptoms are not very indicative of tuberculosis. The 35 children who were known to have been exposed to tuberculosis gave a smaller proportion of positive reports of growing pains than the total group. Night cries, however, were twice as frequent in the exposed group; persistent cough, five times as frequent; fever, nearly three times; and night sweats, four times.

TABLE 56.

HISTORY OF SYMPTOMS SOMETIMES ASSOCIATED WITH TUBERCULOSIS

In total group:	Dr. Moore	Dr. Bronson	Total
Loss of weight	0.7%	0.3%	0.5%
Persistent cough	1.4%	0.3%	0.8%
Fever	1.1%	0.6%	0.8%
Night sweats	3.9%	1.3%	2.5%
Night cries	13.5%	1.6%	7.3%
Growing pains	20.3%	4.8%	12.2%
Per cent of total cases, minus duplications	34.9%	8.7%	21.2%
Cases exposed to tuberculosis:	**Dr. Moore N=25**	**Dr. Bronson N=10**	**Total N=35**
No symptom	64.0%	100.0%	74.3%
Loss of weight	—	—	—
Persistent cough	8.0%	—	5.7%
Fever	4.0%	—	2.9%
Night sweats	16.0%	—	11.4%
Night cries	28.0%	—	20.0%
Growing pains	16.0%	—	11.4%
Per cent of exposed cases minus duplications	36.0%	—	25.7%

Table 57 gives the per cents reported in the Home Blank as having had various infectious diseases. The second and fourth columns of this table give for each disease the per cent of attacks which were described by the parents as "severe" or "very severe," or in words to that effect.

[1]See p. 235 for results of lung examinations.

TABLE 57.

INFECTIOUS DISEASES REPORTED BY PARENTS (HOME BLANK)

	322 Gifted Boys		262 Gifted Girls	
	Have had disease	Cases "severe" or "very severe"	Have had disease	Cases "severe" or "very severe"
Measles	88.8%	19.6%	84.7%	19.9%
Whooping cough	67.8%	24.7%	67.5%	34.5%
Chicken-pox	61.8%	4.5%	60.3%	9.5%
Mumps	37.6%	9.1%	32.8%	11.6%
Influenza	19.3%	37.1%	21.4%	33.9%
Scarlet fever	9.1%	24.1%	7.3%	26.3%
Diphtheria	5.9%	26.3%	7.3%	21.1%
Pneumonia	4.3%	48.0%	5.0%	69.2%

The above figures are almost identical for boys and girls. For both sexes the incidence of scarlet fever, diphtheria, and pneumonia seems high, but comparative data for the general population of the cities are not available. Roughly, one in twelve has had scarlet fever; one in fifteen, diphtheria; and one in twenty, pneumonia. About a quarter of the cases of scarlet fever and diphtheria and half of the cases of pneumonia are described as having been severe or very severe. With an incidence so high, these diseases doubtless rob the world of many potential geniuses. At the same time, the frequency of severe cases among the superior children suggests that contagious diseases may not be as important a factor in the causation of mental defects as they are popularly believed to be. Other serious illnesses reported include 7 cases of smallpox, 6 of typhoid, 3 of infantile paralysis, 7 mastoid operations, and 11 appendix operations.

"After effects" of contagious diseases reported by parents in the Home Blank include the following:

	Cases		Cases
Defect of hearing	16	Loss in general tone	3
Eye defect	15	Mastoid trouble	2
Tonsil trouble	9	Glandular trouble	2
Heart trouble	8	Chronic tonsilitis	2
Colds	4	Indigestion	2
Weak joints	3	Throat trouble	2
Nervousness	3	Mouth breathing	2
Bronchitis	3	Anemia	2

Accidents and Operations

Accidents were reported in the Home Blank as shown in Table 58.

Table 58.

Accidents Suffered by Gifted Children (Home Blank)

	Boys		Girls		Total	
	No. cases	After effects (cases)	No. cases	After effects (cases)	No. cases	After effects (cases)
Accidents						
Broken bones	26	2	17	1	43	3
Motor accident including run-overs	22	4	5	1	27	5
Cuts, burns, and scalds	14	3	13	0	27	3
Sprains or dislocations	6	2	1	0	7	2
Miscellaneous	37	13	30	9	67	22
Total	105	24	66	11	171	35
After-Effects						
Impaired vision		1		0		1
Heart murmur		1		0		1
Minor deformities (fingers, toes, etc.)		3		1		4
Crooked arm		1		0		1
Lameness		1		1		2
Spine affected		0		1		1
Miscellaneous minor defects		17		8		25
Total		24		11		35

Surgical operations were reported by parents in the Home Blank as follows:

	Boys	Girls	Total
Tonsillectomy	157	113	270
Adenoids	161	107	268
Circumcision	57	2	59
Appendectomy	7	4	11
Mastoid	4	3	7
Miscellaneous	24	15	39
Total	410	244	654

"Normal recovery" reported in all except 6 cases.

"Slow recovery" reported in five cases of tonsillectomy.

"Imperfect recovery" from Lorenz operation on hip (one case, child is still a cripple).

Headaches

Information on the frequency of headaches was called for both in the Home Blank and the School Blank. For this condition, we therefore have data from two sources on the gifted, and from one source (School Blank) on a control group. "Frequent" headaches were reported as follows:

Gifted Group				Control Group	
Home Blank		School Blank		School Blank	
Boys	Girls	Boys	Girls	Boys	Girls
2.0%	2.4%	2.3%	2.6%	4.2%	4.9%

That is, home and school reports agree very closely on the gifted, but the school report shows almost twice as many control as gifted having "frequent" headaches. However, when the numbers for "frequent" and "occasional" were combined it was found that teachers report more gifted children than do parents as having headaches, but here also the gifted make a better showing than the control. From these figures it would seem that children are more likely to have at least occasional headaches at school than at home, and that this tendency is more marked with the control than with the gifted. Headaches may be largely psychological! Better physical care, less eyestrain because of more glasses, etc., may account in part for the differences between the control and the gifted, but it is doubtful whether it does so entirely.

Symptoms of General Weakness

The School Blank called for *symptoms of general weakness, if any.* The question was answered for 527 of the gifted group and 594 of the control. Symptoms were reported as shown below.

Table 59.

Symptoms of General Weakness (School Blank)

	Gifted Group			Control Group		
	Boys	Girls	Total	Boys	Girls	Total
Number in group	321	273	594	269	258	527
Pallor	4	4	8	8	5	13
Nervousness	3	2	5	6	4	10

	Gifted Group			Control Group		
	Boys	Girls	Total	Boys	Girls	Total
Faulty nutrition (underweight, etc.)	7	8	15	11	4	15
Posture poor	5	1	6	4	2	6
Anemia	2	2	4	3	3	6
Colds, sore throats, etc.	3	1	4	0	3	3
Spinal defects	1	2	3	0	5	5
Fatigues easily	4	1	5	7	4	11
Skin eruptions	1	0	1	0	2	2
Miscellaneous	11	5	16	8	3	11
Total positive	41	26	67	47	35	82
Per cent positive	12.8%	9.5%	11.3%	17.5%	13.6%	15.6%

The above figures, it will be noted, are considerably more favorable for the gifted than for the control.

Urinary Disturbances

Histories of urinary disturbances[1] were reported by the physicians as shown in Table 60.

Table 60.

History of Urinary Disturbance

	Boys		Girls		
	Dr. Moore	Dr. Bronson	Dr. Moore	Dr. Bronson	Total
Albumenuria	1	–	–	1	2
Cystitis	–	–	2	1	3
Pyelocystitis	–	–	–	1	1
Enuresis	12	3	8	2	25
Frequent urination	–	–	1	2	3
Painful urination	–	1	–	–	1
Retention of urine	–	–	–	1	1
Septic infarct	–	–	–	1	1
Stricture of urethra	–	1	–	–	1
Sugar in urine	–	–	–	1	1
Weak kidneys	–	–	–	1	1
Indefinite	1	2	–	–	3
Total reported	14	7	11	11	43
Per cent of total cases	10.1%	3.9%	7.8%	8.3%	7.3%

[1]See p. 244 for results of urine tests.

Digestive Disturbances

Digestive troubles, past or present, were reported by the physicians as follows:

	Boys		Girls		Total
	Dr. Moore	Dr. Bronson	Dr. Moore	Dr. Bronson	
Reported positive	22	40	24	28	114
Per cent positive	15.9%	22.5%	16.9%	21.2%	19.3%

The above figures agree fairly well with the data on digestive troubles reported in the Home Blank. According to the parents, 15.2 per cent of the boys and 12.5 per cent of the girls have had digestive disturbances.

Nutrition

In the Home Blank nutrition was rated as "excellent," "good," "fair," or "poor"; in the School Blank as "good," "fair," or "poor." Ratings from the two sources are, therefore, not strictly comparable. In the following figures the most significant comparison is between the gifted and control groups in the school reports. It will be noted that the school reports "poor" nutrition nearly three times as frequently in the control as in the gifted group.

Table 61.

Ratings on Nutrition

	N	"Excellent"	"Good"	"Fair"	"Poor"
Gifted Boys, School	296	—	79.4%	16.9%	3.7%
Gifted Girls, "	242	—	86.0%	12.8%	1.2%
All Gifted, "	538	—	82.3%	15.1%	2.6%
Control Boys, "	261	—	71.6%	19.6%	8.8%
Control Girls, "	251	—	80.5%	13.9%	5.6%
All Control, "	512	—	76.0%	16.8%	7.2%
Gifted Boys, Home	315	56.5	36.5%	6.4%	0.6%
Gifted Girls "	255	63.5	29.8%	6.7%	0.
All Gifted, "	570	59.6	33.5%	6.5%	0.4%

Obstructed Breathing

The Home Blank and the School Blank both called for information regarding removal of tonsils and adenoids. In the former, the question was answered for 550 of the gifted group; in the latter, for 511 of the gifted and 493 of the con-

trol. These reports are, of course, less accurate than those of the physicians but they are of interest because they were obtained for a control group in the cities covered by the survey.

Table 62.

Removal of Adenoids and Tonsils

	Gifted Boys	Gifted Girls	All Gifted	Control Boys	Control Girls	All Control
Adenoids Removed						
School Blank	44%	32%	39%	29%	18%	23%
Home Blank	54%	42%	49%	—	—	—
Tonsils Removed						
School Blank	48%	38%	44%	32%	18%	25%
Home Blank	54%	44%	49%	—	—	—

Three facts stand out in the above figures:

(1) A far larger proportion of boys than of girls have had adenoid and tonsil operations. In this the school and the home agree.

(2) Both in the case of adenoids and tonsils, the school reports about 60 per cent more removals for the gifted than for the control.

(3) The home, as would be expected, reports more removals than the school, the latter overlooking about a quarter of all cases.

Of 20,000 Denver children, 10 per cent were reported by teachers as having had adenoids or tonsils removed; of 16,000 Salt Lake City children, 13 per cent. This is far lower even than the figures for our control group, a difference which is probably attributable to better medical attention given to school children in cities of California.

Mouth Breathing

Home and School Blanks called for a rating on mouth breathing as "none," "slight," "marked," or "extreme."

Table 63.

Home and School Reports of Mouth Breathing

	N	Slight	Marked	Extreme	Total
Gifted Boys, Home	285	28%	2%	0 %	30 %
Gifted Girls, "	239	17%	2%	0 %	19 %
All Gifted, "	524	23%	2%	0 %	25 %

	N	Slight	Marked	Extreme	Total
Gifted Boys, School	266	21%	2%	1 %	24 %
Gifted Girls, "	212	13%	3%	0 %	16 %
All Gifted, "	478	18%	2%	0.5%	20.5%
Control Boys, "	228	35%	8%	1 %	44 %
Control Girls, "	222	26%	5%	0 %	31 %
All Control, "	450	31%	7%	0.5%	38.5%

The school reports 50 per cent more cases of mouth breathing in the control than in the gifted group, and three times as many cases which are "marked" or "extreme." This would be expected from the fact that the gifted have more often had adenoid and tonsil operations.

There is a marked sex difference in favor of the girls. This is observed in both home and school reports, and for both gifted and control groups. A similar difference, in the same direction, was found with respect to frequency of adenoid and tonsil removal; that is, the girls have less often had tonsils or adenoids removed, and are less often mouth breathers. Somewhat more mouth breathers were reported by parents than by teachers. No consistent age tendencies were found.

Since the gifted were classified into four grades by both home and school, it was possible to compute the correlation between the two ratings for extent of mouth breathing. This was done and found to be .56.

Of 16,000 children in Salt Lake City, 9 per cent were classified by their teachers as mouth breathers. The school report for our gifted is 20.5 per cent, and for our control group 38.5 per cent. The number of "marked" or "extreme" cases for our gifted group is only 2.5 per cent (school report), and for our control group 7.5 per cent.

Frequency of Colds

Frequency with which the children suffered colds was reported in the Home and School Blanks as follows:

Table 64.

Frequency of Colds

	N	Freq. or very freq.	Occasionally	Rarely
Gifted Boys, Home	307	16%	47%	37%
Gifted Girls, "	253	7%	44%	49%
All Gifted, "	560	12%	46%	42%

	N	Freq. or very freq.	Occasionally	Rarely
Gifted Boys, School	279	13%	30%	57%
Gifted Girls, "	222	6%	19%	75%
All Gifted, "	501	10%	25%	65%
Control Boys, "	245	9%	35%	56%
Control Girls, "	241	7%	34%	59%
All Control, "	486	8%	35%	57%

Again we find a marked sex difference in favor of the girls. In the gifted group more than twice as many boys as girls are said to have colds frequently or very frequently.

The school reports a somewhat higher percentage of frequent or very frequent colds for the gifted than for the control, but this is offset by a higher percentage of gifted reported under the caption "rarely."

Of 16,000 children in Salt Lake City, 20 per cent were reported by teachers as having colds as often as two or three times a month.

Hearing[1]

Per cents rated in the Home and School Blanks as "somewhat defective," "poor," or "very poor" in hearing are as follows:

Gifted, both sexes, Home Blank	3.6%
Gifted, both sexes, School Blank	2.3%
Control, both sexes, School Blank	5.9%

That is, parents report more cases of defective hearing among the gifted group than do teachers, and teachers report nearly three times as many cases for the control group as they report for the gifted. The difference is probably large enough to be significant, and may be related to the fact that more of the gifted group have had adenoids and tonsils removed.

Data were worked out for the sexes separately, but no significant differences were found.

A similarly worded question used by the writer in school surveys gave 4 per cent of 20,000 children with defective hearing in Denver, and 5 per cent of 16,000 in Salt Lake City.

[1]See p. 224 for results of hearing tests.

Vision[1]

The School Blank called for a rating of vision (without glasses) as normal, somewhat defective, or very poor; also for information as to whether the child wore glasses. Combining ages, we have the following proportions of gifted and control groups rated either as "somewhat defective" or as "very poor":

	Gifted			Control		
	Boys	Girls	Both	Boys	Girls	Both
Subnormal vision	19.9%	20.7%	20.3%	16.5%	15.4%	16.0%
Wearing glasses	10.9%	10.3%	10.6%	4.0%	5.4%	4.7%

About a quarter more cases of subnormal vision are reported for the gifted than for the control. This may be due to the fact that the gifted use their eyes more for reading, writing, and other near work. A more probable explanation is that with a given degree of defect the gifted, because of the greater intelligence of their parents, are more likely than other children to have the vision corrected by glasses; this would call the teacher's attention to the existence of a defect and cause it to be reported.

Nervous Disturbances[2]

Under "later history" the physicians report 45.1 per cent of the boys and 32.3 per cent of the girls as having had a record of nervous symptoms, Dr. Bronson reporting about 50 per cent more than Dr. Moore. One-third of all cases are accounted for by nail-biting. The remaining two-thirds are distributed widely among such symptoms as restless, "nervous," excitable, headaches, twitching, restless sleep, grinding teeth, sensitiveness, etc.

Both Home and School Blank contain the question, *Is child especially nervous?* We thus have reports from both sources on the gifted, and from one source (School Blank) on a control group. The data are as follows:

	Gifted			Control		
	Boys (N = 295)	Girls (N = 240)	Total (N = 535)	Boys (N = 284)	Girls (N = 243)	Total (N = 527)
School Report	16.3%	9.6%	13.3%	15.9%	16.4%	16.1%
Home Report	24.7%	15.0%	20.4%	—	—	—

[1]See p. 226 for results of vision tests.

[2]See p. 243 for nervous conditions found in the medical examinations.

The parents report about 50 per cent more cases of nervousness than the teachers. Teachers report about the same number of gifted and control boys as nervous, but about 75 per cent more control than gifted girls.

In a survey of the Denver schools approximately 10 per cent of about 20,000 children enrolled were described by their teachers as showing such symptoms as muscular twitching, nervousness, excessive timidity, tendency to cry or to worry, stuttering, etc. The same method in a survey of the Salt Lake City schools gave 11.8 per cent of about 16,000 for whom the question was answered.[1] Teachers in Philadelphia reporting on 4,000 children classified 11.4 per cent of the boys and 9.6 per cent of the girls as nervous.[2] There is nothing in the above data to indicate that gifted children are more likely than others to show the ordinary symptoms of nervousness.

In response to the question, *How shown?* 41 different symptoms of nervousness were mentioned. Of these, restlessness, excitability, irritability, and nail-biting account for more than half the cases. The other symptoms include crying without cause, twitching, timidity, stuttering, worry, sensitiveness, trembling, restless sleep, etc. No significant differences were found between the gifted and control groups in the nature of the symptoms shown.

Information on *stuttering* was asked for specifically in both Home and School Blank; also information regarding its severity. The results are as follows:

	Gifted			Control		
	Boys	Girls	Total	Boys	Girls	Total
School Blank	4.1%	0.8%	2.6%	6.0%	0.8%	3.4%
Home Blank	2.9%	0.9%	2.0%	—	—	—

Omitting the "slight" and "very slight" cases, we have the following:

	Gifted			Control		
	Boys	Girls	Total	Boys	Girls	Total
School Blank	1.4%	0	0.7%	0.8%	0	0.4%
Home Blank	1.1%	0	0.6%	—	—	—

[1]The Denver and Salt Lake City data were collected by the writer by the use of questionnaire which was filled out by every classroom teacher in each city. The questionnaire asked the number of children in the class who showed symptoms of various kinds of defects.

[2]W. S. Cornell: *Health and Medical Inspection of School Children*, 1912, p. 595.

That the majority of all cases reported are not very serious is indicated by the fact that of the gifted group only 1.0 per cent are reported as stutterers by both home and school. Of 20,000 children in Denver, 3 per cent were reported by their teachers as stutterers; of 16,000 children in Salt Lake City, 1.8 per cent. Conradi's census of 87,000 children in various cities of the United States gave 2.46 per cent with speech defects and 0.87 per cent as stutterers. There is no evidence in the above figures that stuttering is more common among gifted than among normal children.

The teachers report no case of *chorea* for either the gifted or control group. The parents report 2 in the gifted group as having had an attack several years previously. Two cases in more than 500 represent about the normal frequency.

Information regarding *marked fears* was asked for only in the Home Blank, hence no control data are available. Of the gifted boys, 10.3 per cent were reported as having "marked fears"; of the gifted girls, 13.0 per cent. Approximately 80 per cent of the cases were under the age of eleven years. As causes of fear, darkness is mentioned 20 times; dogs and fire, 6 each; other animals than dogs, 5 times; nothing else more than twice.

School reports were secured on *excessive timidity* for gifted and control groups. The results are as follows:

	Gifted			Control		
	Boys	Girls	Total	Boys	Girls	Total
Number reported on	284	228	512	242	230	472
Per cent timid	4.9%	10.5%	7.4%	6.6%	7.4%	7.0%

It will be noted that although there is little difference between the gifted and control group, sexes combined, the gifted girls are reported "timid" twice as frequently as gifted boys. In the control group the difference is smaller, but in the same direction.

The question in the Home Blank asking whether the child had had *night terrors*, and how often, brought positive reports for 9.4 per cent of the boys, and for 10.5 per cent of the girls. However, only 20 of the 51 who had had night terrors were subject to frequent attacks. This is out of a total of 515 reported on. The proportion having had frequent attacks is, therefore, 4 per cent. More than three-fourths of

all cases occurred before the age of eight years. More than half were described simply as "bad dreams" or "nightmares" with screaming or crying on waking.

Tendency to worry was reported as follows in the Home and School Blanks:

	Gifted			Control		
	Boys	Girls	Total	Boys	Girls	Total
School Blank	9.2%	12.0%	10.4%	7.8%	10.1%	9.0%
Home Blank	8.8%	9.8%	9.3%	—	—	—

No significant difference is found between the gifted and control groups, or between the home and school reports on the gifted. There were no marked age differences. School work was given as the source of worry in about half the cases in both gifted and control groups.

Habitus

The following data on habitus are summarized from the medical blanks and are based in part on the observations of the examining physicians and in part on information reported to them by the parents.

Table 65.

Summary of Physicians' Reports on Habitus

	Dr. Moore		Dr. Bronson	
	Boys	Girls	Boys	Girls
Muscularly strong	88.5%	95.8%	87.0%	91.0%
Muscularly weak	11.5%	1.4%	14.6%	9.1%
Well-balanced	92.0%	97.2%	72.5%	71.2%
Unstable	8.2%	2.8%	28.1%	28.8%
Irritable	18.0%	7.1%	18.0%	12.9%
Easily fatigued	10.8%	6.3%	12.4%	14.4%
Active	84.1%	89.4%	80.3%	79.5%
Quiet	15.8%	9.9%	18.0%	19.7%
Manageable	97.1%	96.5%	93.8%	92.5%
Unruly	2.9%	0.7%	6.2%	6.1%

The highly subjective nature of the judgments on which the above figures are based is indicated by the large difference in the reports of the two physicians on certain items. Dr. Bronson, for example, reports 28.8 per cent as "unstable," as compared with 2.8 per cent reported by Dr. Moore. She also reports nearly four times as many "unruly" as are reported by Dr. Moore. Dr. Moore reports three times as many

boys as girls as "unstable," a sex difference which is not found in the data of Dr. Bronson. However, both physicians report more boys than girls as "irritable." Dr. Moore reported nearly twice as many children of the ages 10 to 13 as of the younger ages to be muscularly weak, unstable, irritable, easily fatigued, and unruly, while in Dr. Bronson's data there were no significant age differences.

Eating Habits

Eats fast. Of Dr. Moore's cases, 45.3 per cent of boys and 22.5 per cent of girls were reported as "eating fast"; of Dr. Bronson's cases, 43.8 per cent of boys and 31.1 per cent of girls; of the entire group, 44.1 per cent of boys and 26.6 per cent of girls. In the reports of both physicians the boys show a small but probably significant increase as adolescence approaches in the proportion of eating fast; the girls show a noticeable decrease.

Eats between meals. Of Dr. Moore's cases, 62.5 per cent of the boys and 58.5 per cent of the girls are reported as eating between meals; of Dr. Bronson's cases, 23.6 per cent of the boys and 16.7 per cent of the girls. However, in 36.8 per cent of Dr. Bronson's records the data on this point were not obtained. There were no marked age differences.

Daily consumption of milk. The average daily amount of milk consumed by the boys is 1.12 pints; by the girls, 1.10 pints. Of the boys 2.2 per cent are reported as drinking no milk; of the girls, 6.9 per cent.

Green vegetables daily. This question is answered "yes" for 88.5 per cent of boys and 93.7 per cent of girls in Dr. Moore's group; and for 74.7 per cent of boys and 77.3 per cent of girls in Dr. Bronson's group.

Eats meat daily. Dr. Moore reports "yes" for 60.4 per cent of boys and 59.2 per cent of girls; Dr. Bronson for 71.3 per cent of the boys and 72.0 per cent of girls. It would be interesting to know whether the difference between the two groups is due to the more stimulating climate of the San Francisco Bay region where Dr. Bronson's cases live.

Eats fruit daily. The record is "yes" for all but one of Dr. Moore's group, and for 84.3 per cent of Dr. Bronson's boys and 86.4 per cent of her girls.

Drinks tea. Of Dr. Moore's boys, 8.6 per cent are reported as drinking tea. In only two of these cases is the amount more than one cup a day; in three cases the tea is described as "very weak." Of the girls, 2.8 per cent are reported; in no case more than one cup a day. Of Dr. Bronson's boys, 9.5 per cent drink tea at least occasionally. The amount is not specified. Thirteen, or 9.8 per cent, of Dr. Bronson's girls drink tea. One 7 year old boy is reported, but no others under 9.

Drinks coffee. In Dr. Moore's group the record is "yes" for 8.6 per cent of boys and 9.2 per cent of girls; in Dr. Bronson's group, for 15.2 of boys and 17.4 per cent of girls. No boy under 9 and no girl under 7 was reported as drinking coffee, and in no case was the amount more than one cup daily.

Eats candy. The data on this point can be taken as suggestive only, as the answers were recorded in rather indefinite terms. Rough groupings were made as shown below. No marked age or sex differences were found.

	Dr. Moore	Dr. Bronson
1. "None," "very little," "rarely," "once a week"	29.6%	24.8%
2. "Occasionally," "some," "moderate amount," "two or three times a week"	58.7%	31.0%
3. "Daily," "often," "too much," "considerable," "a good deal"	5.3%	39.0%
4. Not answered	6.4%	5.2%

Personal Hygiene

Data on *constipation* are reported by the physicians as follows:

	Dr. Moore		Dr. Bronson	
	Boys	Girls	Boys	Girls
"Regular"	94.3%	90.0%	87.0%	88.6%
"Constipated"	5.0%	8.4%	8.4%	9.0%
No record	0.7%	1.6%	4.6%	2.4%

The following figures summarize the frequency of *brushing teeth,* as reported to physicians by parents. The various age groups are combined, as no significant age differences were evident.

Dr. Moore	N	Number of times daily: Not at all	Once	Twice	Oftener	Indefinite answer
Boys	139	1.4%	56.8%	31.7%	1.4%	8.7%
Girls	142	1.4%	51.5%	42.3%	0.7%	4.1%
Total	281	1.4%	54.1%	37.0%	1.1%	6.4%
Dr. Bronson						
Boys	178	2.8%	50.6%	39.3%	3.9%	3.3%
Girls	132	0.8%	31.8%	59.8%	6.1%	1.5%
Total	310	1.9%	42.6%	49.1%	4.8%	2.6%

The mean number of *baths per week*, by age and sex, as reported to the physicians, was as follows:

	Mean number of baths per week by age										
Age	2–4	5	6	7	8	9	10	11	12	13	14
Boys	3.7	2.7	3.4	2.6	2.5	3.0	2.2	2.2	2.3	2.2	3.4
Girls	4.5	5.0	3.4	2.8	2.8	2.4	2.4	2.6	2.1	2.3	2.3

Sleep Habits

The Home Blank called for the child's usual hour of going to sleep, time required to go to sleep, and soundness of sleep. Table 66 gives the median number of hours of sleep

Table 66.

Hours of Sleep of Gifted Children

	Age									
Hours	2–3–4	5	6	7	8	9	10	11	12	13
12½	–	–	–	1	–	–	1	–	–	–
12	2	2	4	4	6	2	4	–	1	–
11½	9	9	6	7	12	5	2	5	4	1
11	1	5	7	17	16	32	21	16	9	1
10½	2	4	10	14	26	31	30	33	16	6
10	–	–	1	3	10	17	37	30	23	6
9½	1	–	1	–	4	6	12	10	9	4
9	–	–	1	–	2	1	9	10	5	2
8½	–	–	–	–	–	–	2	2	2	1
8	–	–	–	–	–	–	–	–	–	–
7½	–	–	–	–	–	1	–	–	–	–
Mean	11:47	10:29	11:09	11:14	10:58	10:38	10:31	10:27	10:26	10:15
S.D.	47 min.	55 min.	43 min.	34 min.	41 min.	37 min.	44 min.	40 min.	43 min.	41 min.
Mean for 2,692 control cases			11:14	10:41	10:42	10:13	9:56	10:00	9:36	9:31

by age for the gifted group, together with the age means found by Terman and Hocking for 2,692 unselected children.[1]

Table 66 indicates that these gifted children sleep more on the average than do unselected children. The difference is small at six years, but increases to about three-quarters of an hour by the age of 12 years. Terman and Hocking found that feeble-minded children of the ages 6 to 13 sleep considerably less than normal children, but that feeble-minded adults sleep more than normal adults.

"Average time required to go to sleep" is 7 minutes for the group. Sleep is reported by the parents as "sound" for 98.9 per cent of all cases.

The physicians report that 79 per cent of boys and 70 per cent of girls, or 75 per cent of all, sleep alone; and that 96 per cent sleep with window open. A daily "nap" is reported for 7 girls and 8 boys, all but two of whom are under 8 years.

Hours Out of Doors Daily

As would be expected, the boys spend somewhat more time out of doors than do the girls, but there are no significant age differences. In Dr. Moore's group, the boys average 3.5 hours daily out of doors; the girls, 3.3 hours. Dr. Bronson's figures show an average of 2.6 hours for boys and 1.9 hours for girls. There are 3 of Dr. Moore's group who spend less than one hour out of doors, as compared with 24 of Dr. Bronson's group. Of Dr. Moore's group, 23 spend five or more hours out of doors; of Dr. Bronson's group only one. (Data for 587 cases).

Sexual Development of Gifted Boys

Condition of the pubic hair was recorded by Dr. Moore in the case of 115 boys of 9 years and older, for comparison with Crampton's data from 3,835 boys in the high schools of New York City.[2]

Crampton takes as his criterion of completed pubescence the "appearance of the kink or twist" (in pubic hair) "which is definitely characteristic." When this appears he considers

[1]The Sleep of School Children, etc. *J. of Educational Psych.*, 1913, 138–147; 199–208; 269–282.

[2]*American Physical Educational Review*, 1908.

that the boy has reached puberty. During the period which extends from the beginning of the growth of pubic hair up to the time when the kink appears the boy is said to be pubescent.

Crampton's figures are based upon examination of 3,835 high school boys in New York City during the years 1901-06. Of these boys, 98 per cent were American born, but in about 40 per cent of the cases both parents were born abroad. He calls attention to the differences in sex development between the various racial groups only in a general way, except for the German group, in which, he points out, puberty tends to occur at a later period than with children of American born parents.

The data for Dr. Moore's group are as follows:

Age	Cases examined	Hair present	Per cent	Hair kinky	Per cent
9	16	1	6.3%	0	—
10	21	0	0%	0	—
11	29	5	17.2%	0	—
12	27	12	44.4%	0	—
13	14	13	92.9%	3	21.4%
14	5	5	100.0%	5	100.0%
15–16	3	3	100.0%	3	100.0%

As will be seen from the figures below, the children of foreign born parents were much more numerous in Crampton's group.

Birthplace of Parents	Gifted Group (115 cases)	Crampton's (3835 cases)
Germany	2.3%	22.6%
British Isles	3.7%	12.9%
Russia	5.1%	6.2%
Austria-Hungary	1.0%	6.2%
Scandinavia	1.8%	1.6%
Italy	0.4%	2.2%
France	0.9%	1.0%
Miscellaneous	6.0%	2.6%
UNITED STATES	78.7%	44.8%
	99.9%	100.1%

Table 67 shows the proportions of post-pubescents, pubescents, and pre-pubescents in the two groups at successive ages.

TABLE 67.

ADOLESCENT DEVELOPMENT, GIFTED AND NORMAL BOYS

Age	Post-pubescents (hair kinky)		Pubescents (hair present but straight)		Pre-pubescents (no hair)	
	Crampton	Gifted	Crampton	Gifted	Crampton	Gifted
12	6.0%	0.0%	15.5%	44.4%	75.0%	55.6%
13	24.5%	21.4%	27.0%	71.4%	48.0%	7.1%
14	53.0%	100.0%	26.0%	0.0%	21.0%	0.0%
15	77.5%	100.0%	15.0%	0.0%	7.0%	0.0%
16	94.0%	0.0%	4.0%	0.0%	1.5%	0.0%
17	99.0%	—	0.0%	—	0.0%	—

The above figures would indicate that the gifted boy tends to mature somewhat earlier than the average, but the numbers in the gifted group are too small to be more than suggestive.

Condition of pubic hair was not noted by Dr. Bronson, but change of voice was recorded by both physicians for all boys of 10 years or older. The figures are as follows for the total of 221 cases.

Age	Total cases	Number changing	Per cent changing or changed
10	59	1	1.7%
11	69	4	5.8%
12	51	17	33.3%
13	30	14	46.7%
14	9	6	66.7%
15–16	3	3	100.0%

SEXUAL DEVELOPMENT OF GIRLS

Presence or absence of pubic hair was recorded by both physicians for all girls of 10 years and over. Dr. Moore's cases were examined by a woman assistant. Condition of hair is noted in some instances as scanty or profuse, straight or kinky, but not in all; hence no differentiation is made in the totals given below. Reports of the two physicians agreed closely and have therefore been combined.

Age	Total cases	Pubic hair present	Per cent of total
10	43	3	7.0%
11	47	16	34.0%
12	39	23	59.0%
13	38	31	81.6%
14	9	9	100.0%
15–16	3	3	100.0%

TABLE 68a.

AGE OF FIRST MENSTRUATION OF AMERICAN GIRLS

Group	Total cases	Age of first menstruation (taken to last birthday) 10	11	12	13	14	15	16	17 or older	Mean
1. Girls of 15 or older			4	9	18	10	6			
U. of Iowa Ele. and H. S.	47	—	8.5%	19.1%	38.3%	21.3%	12.8%	—	—	13.61
2. Girls of 16 or older,			7	25	56	42	17	4		
Horace Mann Ele. and H. S.	151	—	4.6%	16.6%	37.1%	27.8%	11.3%	2.6%	—	13.82
3. Girls of 16 or older,			3	9	22	14	6	2		
U. of Chicago Ele. and H. S.	56	—	5.4%	16.1%	39.3%	25.0%	10.7%	3.6%	—	13.80
4. Girls above 16 in		3	10	27	40	36	13	5		
Baltimore Co., Md.	134	2.2%	7.5%	20.1%	29.8%	26.9%	9.7%	3.7%	—	13.66
5. American women,		4	26	49	107	142	112	83	42	
Boston Hospital[1]	565	0.7%	4.6%	8.7%	18.9%	25.1%	19.8%	14.7%	7.4%	14.77
6. Ithaca, N. Y.	338		3	24	57	81	108	65	—	
			—1.0%	7%	17%	24%	32%	19%	—	14.87

[1]Bowditch reports observation of 575 cases, but gives facts for only 565. Per cents, therefore, are taken with 565 as the base.

Age of first menstruation for those who have already matured is as follows, for the "present age" groups taken separately. It will be noted that age is taken to last birthday.

		Age of first menstruation (taken to last birthday)					
Present age	N	10	11	12	13	14	15
10–11	43	1	–	–	–	–	–
11–12	47	–	1	–	–	–	–
12–13	39	1	1	9	–	–	–
13–14	38	–	7	11	10	–	–
14–15	9	–	1	4	2	–	–
15–16	3	1	–	–	–	–	1

Table 68a gives comparative data for age of first menstruation of normal American girls. The data for the first four groups are taken from Bird T. Baldwin's *Physical Growth of Children from Birth to Maturity,* University of Iowa Studies, 1921, p. 190. These groups are described as coming from the middle and upper social classes. Group 5 is reported by H. P. Bowditch, *Massachusetts Board of Health Report,* 1877, and Group 6 by Burlage, *American Journal of Physiology,* April, 1923.

Probably the data for the first four groups are the most accurate. The following figures (Table 68b) permit a com-

TABLE 68b.

COMPARISON OF GIFTED GIRLS WITH NORMS IN AGE OF FIRST MENSTRUATION

		Per cent who had matured before various ages			
	N	11	12	13	14
Baldwin's[1] four groups	388	3 0.8%	27 7%	97 25%	233 60.1%
Gifted, 11 years old or older	136	0	—	—	—
Gifted, 12 years old or older	89	2 2.2%	11 12.4%	—	—
Gifted, 13 years old or older	50	1 2.0%	9 18.0%	24 48.0%	— —
Gifted, 14 years old or older	12	1 8.3%	2 16.7%	6 50.0%	8 66.7%

[1]The figures presented for Baldwin's four groups in Table 68b have been derived from the data in Table 68a. It will be noted that in Table 68a the age of first menstruation is given to the *last* birthday, while Table 68b gives the number who have matured *before* a given birthday. Accordingly, the number who matured *before* 13, for example, is the sum of those who are recorded in Table 68a as having matured at 10, 11, and 12.

parison between this combined group of 388 girls and the girls of the gifted group with respect to the number of those who were eleven years old or older who had matured *before 11* or *before 12;* of the number who were thirteen years old or older who had matured *before 11, before 12,* or *before 13,* etc.

The number of gifted girls who have reached 13 or 14 is too small to give the above figures a very high degree of reliability, but as far as they go they indicate a tendency to considerably earlier maturity for the gifted than for unselected girls. For example, of gifted girls 13 years old or older, about half matured before the age of 13, as compared with a quarter of unselected girls.[1]

Mammary development of girls was recorded by Dr. Moore but not by Dr. Bronson. A positive report includes all cases in which the pubertal development of the mammary glands had begun. Because of the difficulty of interpreting the records no attempt has been made to differentiate as to extent of development. No strictly comparative data are available.

	Present age				
	9	10	11	12	13 or over
Cases	22	25	20	18	20
Positive	1	14	16	16	20
Per cent positive	4.5%	56%	80%	89%	100%

Seven histories of masturbation were reported to the physicians, including 4 boys and 3 girls. The data on this point are probably very incomplete.

Summary

1. Data on health history for about 90 per cent of the main gifted group were obtained from the Home Blank, the School Blank, and the medical examiner's case history records. By means of the School Blank comparative data on many points were obtained from a representative control group of corresponding age attending the same schools which the gifted children attended.

2. Of the gifted group 4.4 per cent were born prematurely, 2.7 per cent as early as eight months. In only 7.8 per cent of cases was the mother's health during pregnancy rated as "poor" or "very poor."

[1]Compare with similar data for the gifted high school group, p. 578.

3. The mean birth weight was approximately three-fourths of a pound above the norm according to accepted standards. This excess amounts to three-fifths of the standard deviation of the birth weights of the gifted.

4. Approximately 19 per cent of the male births and 12 per cent of the female births involved instrumental delivery.

5. Only 8.2 per cent of the gifted were bottle fed during the entire period, while 47.5 per cent were breast fed only and 43.5 were partly breast fed. The proportion of breast feeding was considerably higher than for the general population, and was appreciably higher for the cases above 160 IQ than for the entire group.

6. Health during the first year was rated by the mothers as "excellent" or "good" for 74 per cent of cases, and as "very poor" for only 3.3 per cent.

7. Age of learning to walk averaged about one month less, and of learning to talk about three and a half months less, than mean ages for normal children. Dentition was perhaps slightly precocious.

8. Summary of contagious disease history shows no important deviations of this group from the normal child population, unless perhaps a rather high per cent have had scarlet fever (9.1 per cent) and diphtheria (5.9 per cent.)

9. Nearly a third of the group have suffered one or more accidents; about 8 per cent of the group, bone fracture. The number of surgical operations averaged slightly more than one per child, more than half of which were for adenoids or tonsils.

10. About half as many of the gifted as of the control group, according to school reports, suffer frequent headaches.

11. Symptoms of "general weakness" were reported by the school nearly 30 per cent less frequently for the gifted than for the control group.

12. The school reports nutrition as "poor" for 2.6 per cent of the gifted as compared with 7.2 per cent of the control. This is in harmony with the results of metabolism tests reported in Chapter IX.

13. More than half of the gifted group had undergone tonsillectomy, as compared with about a quarter of the control group.

14. "Marked" or "extreme" mouth breathing is reported only one-third as frequently for the gifted as for the control group.

15. In frequency of colds, no significant difference was found in the school reports on the two groups.

16. Defective hearing is approximately two and a half times as frequent among the control as among the gifted, according to school reports.

17. The school reports about a quarter more cases of defective vision for the gifted than for the control.

18. Indications of "nervousness" are reported by the school for 13.3 per cent of gifted and for 16.1 per cent of control. Stuttering, including mild cases, is reported for 2.6 per cent of the gifted and for 3.4 per cent of control. Only two cases gave a history of chorea. "Excessive timidity" and "tendency to worry" were reported with about equal frequency in the gifted and control groups.

19. The data on habitus are difficult to evaluate, because of lack of suitable control data.

20. Case histories obtained by the medical examiners indicate that for the gifted group the dietary regime is above the average for the general child population.

21. Approximately 8 per cent of the gifted group suffer more or less from constipation.

22. The gifted children show significant excess of daily hours of sleep as compared with the Terman and Hocking norms. The excess is slight with the younger children, but amounts to about fifty minutes by age 12.

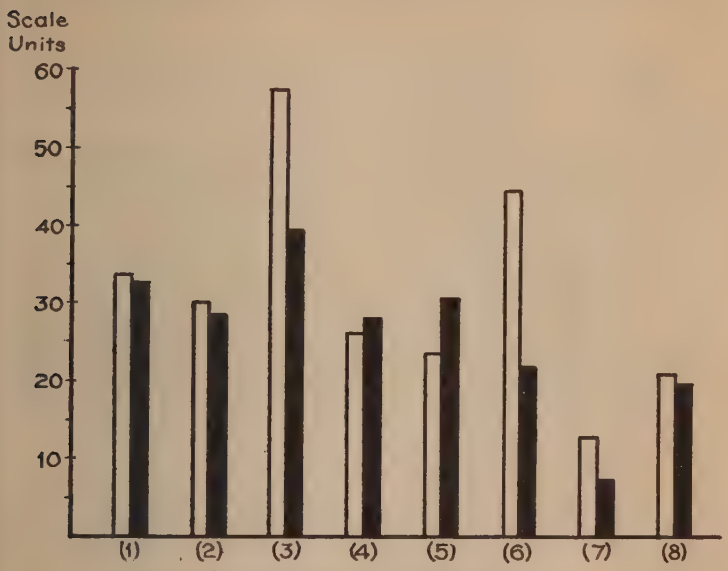
23. The gifted boys spend on an average about three hours out of doors daily, the girls about two and a half hours.

24. Pubescence, as indicated by amount and kinkiness of the pubic hair, occurs on the average somewhat earlier among gifted than among unselected boys. Owing to the small number of gifted boys above twelve years, this conclusion is only tentative.

25. Of gifted girls 13 years old or older, 48 per cent had menstruated before 13, as compared with 25 per cent for unselected girls.

FIGURE 9.

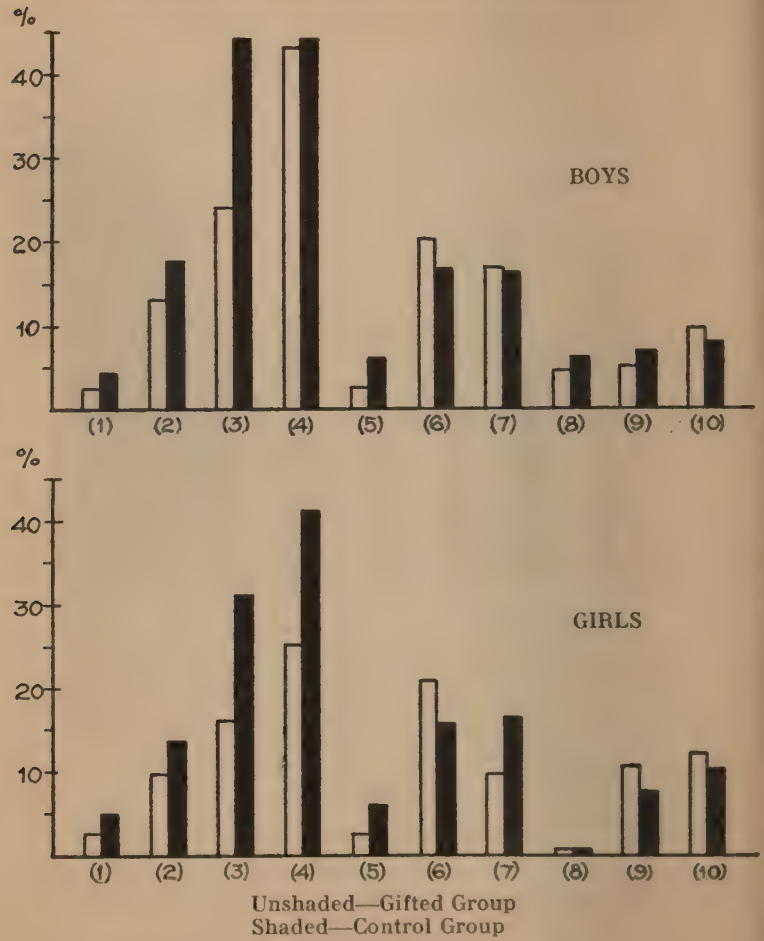
GROWTH AND DEVELOPMENT OF GIFTED AND UNSELECTED CHILDREN



Unshaded—Gifted Children
Shaded—Unselected Children

(1) Mean birthweight of boys, in quarter pounds.
(2) " " " girls " " "
(3) Per cent breast fed eight months or longer, both sexes.
(4) Age of walking, in half months, boys.
(5) " " talking " " " "
(6) Per cent of 12-year boys having pubic hair.
(7) Per cent of girls menstruating before 12 years.
(8) Daily sleep, in half hours, both sexes.

FIGURE 10.
PHYSICAL DEFECTS IN GIFTED AND CONTROL GROUPS



Unshaded—Gifted Group
Shaded—Control Group

(1) Per cent having frequent headaches.
(2) " " with symptoms of general weakness.
(3) " " of mouth breathers.
(4) " " who have colds occasionally or often.
(5) " " with poor or very poor hearing.
(6) " " with vision somewhat defective or poor.
(7) " " nervous.
(8) " " with speech defects.
(9) " " who are exceptionally timid.
(10) " " who show tendency to worry.

CHAPTER IX

MEDICAL EXAMINATIONS[1]

Subjects

Medical examinations were given by the two physicians to 783 children of the various gifted groups. The purpose of this, as of other divisions of our study, was two-fold: (a) to secure data that would contribute to a better understanding of individual cases; and (b) to secure a basis for generalizations with respect to the health conditions of gifted children in general. In the interest of the latter purpose the present summary is confined to the medical examinations of 591 gifted subjects of the main experimental group. The number of families represented is 502, or 87 per cent, of the total of 578 in the main group. A small part of the loss of 13 per cent was due to Christian Science beliefs of the parents, the greater part to such causes as change of residence, illness in the family, difficulties in the way of bringing the child for examination, etc. Table 69 gives the distributions of the

Table 69.

Subjects of Main Group Given Medical Examinations

	Dr. Moore			Dr. Bronson			
Age	Boys	Girls	Total	Boys	Girls	Total	Total
2–3–4	2	5	7	1	1	2	9
5	3	2	5	4	0	4	9
6	3	5	8	6	3	9	17
7	7	12	19	3	5	8	27
8	9	13	22	14	7	21	43
9	16	22	38	28	20	48	86
10	21	25	46	38	18	56	102
11	29	20	49	40	27	67	116
12	27	18	45	24	21	45	90
13	14	13	27	16	25	41	68
14	5	5	10	4	4	8	18
15–16	3	2	5	0	1	1	6
Total	139	142	281	178	132	310	591

[1]Examinations by Dr. Albert H. Moore and Dr. Edith Bronson. Statistics of results prepared by Goodenough and Terman.

591 subjects by age, sex and examining physician. Age in Table 69 is age at last birthday preceding the medical examination, and averages about a year greater than age at the time the subjects were first located and tested.

Previous Experience of the Examining Physicians

The professional records of the examining physicians are as given below:

Dr. Moore: B.S., University of Minnesota, 1895; M.D., University of Minnesota, 1897; post graduate work in New York City about twelve months; post graduate in pediatrics in New York and Baltimore; eighteen years in general practice in New York City and New Rochelle, N. Y.; Captain, Medical Corps of the United States Army, in 1918; Senior residency in pediatrics at the University of California through 1919-20; attending physician in pediatrics through 1920-21 in San Francisco state and county hospital; at present a member of the Hollywood Medical Group, practice limited to children; member of the Clinical Staff of the Children's Hospital of Los Angeles; member of the Attending Staff of the Hollywood Hospital.

Dr. Bronson: M.D., Johns Hopkins University, 1913; Interne, Children's Hospital, San Francisco, 1913-14; Resident Physician, New York City Children's Hospital, Randall's Island, 1914-15; Resident Physician, Hospital for Sick Children, Edinburgh, 1915-16; Resident Physician, Paddington Green Children's Hospital, London, 1916-17; Resident Physician, Pendlebury Children's Hospital, Manchester, 1917-18; Temporary Physician, Out-Patient Dept., Children's Hospital, Great Ormond St., London, 1918–19; Associate Physician, Children's Hospital, San Francisco, 1919–23; Assistant Professor, University of California Medical School, 1923.

It is evident from the above records that both physicians were exceptionally well qualified by training and experience for making the proposed examinations. Both were recommended for the work by the pediatric department of the University of California and Stanford University Medical Schools. Both are highly trained specialists in children's diseases. Dr. Moore has had much more experience in gen-

eral practice, but Dr. Bronson has had a somewhat more varied and extended hospital experience. In a comparison of the data reported separately by the two physicians in this chapter it is well to bear in mind this difference in their experience, as it probably accounts for some of the differences in number and kind of defects reported. It was most fortunate for the investigation that two such competent examiners were available. Both took a genuine research interest in the outcome and worked with the most painstaking devotion.

Examination Schedule and Procedure

The examination schedule was planned in conference between the examining physicians and an advisory committee of the Stanford University medical faculty.[1] It was based in large part upon a schedule which had been used for some time by Dr. H. K. Faber, of the Stanford pediatrics department. It is intended to provide for an examination of approximately one hour duration, about equally divided between history and examination proper. The section of the schedule pertaining to history has been given in the preceding chapter. The section pertaining to the examination follows:

PHYSICAL EXAMINATION

General Impression	Degree of prostration ..... Apparent nutrition ..... Facies ..... Color { skin ..... { m.m. .....
Skin	Eruption ..... Moist ..... Turgor ..... Pigment ..... Dry ..... Sweat ..... Oedema ..... Vasomotor .....
Head	Shape ..... Fontanelle ..... Bosses ..... Scalp ..... Hair ..... Sutures .....
Ears	Rt. ..... Hearing ..... M. T. Rt. ..... Left ..... Left ..... Ingersoll watch at ..... Mastoid ..... Discharge .....
Eyes	Rt. ..... Lids ..... Corneae ..... Irides ..... Vision ..... Left ..... Conjunctivae ..... Pupils ..... Equal ..... Regular ..... Discharge .....
Nose	Shape ..... Discharge ..... Blood ..... Obstruction ..... Excoriation .....
Mouth	Lips ..... Tongue ..... Rt. tonsil ..... Left tonsil ..... Pharynx ..... Gums ..... Teeth ..... No. 1st ..... No. 2nd ..... Soft palate ..... Hard palate .....
Neck	Larynx ..... Sternomastoids ..... Stiffness ..... Thyroid ..... Glands: ant. ..... post. ..... rt. ..... lft. ..... Retraction .....
Chest	Deformity ..... Expansion ..... Resp. ..... Beading ..... Intercostal angle ..... rate ..... rhythm ..... Lungs: Percussion ..... Palpation ..... Auscultation ..... Breath ..... Rales ..... Voice ..... Rhonchi. Heart: size ..... Impulse ..... Rate sitting ..... Apex ..... Pulm. Murmur Shape ..... Thrill ..... Rhythm ..... Sounds Tricusp ..... Aort.

[1]For personnel of this committee see p. 12.

Abdomen	Distension....Patterns.....Tenderness.....Oedema..... Hernia.....
	Recti.....Masses.....Spasm.....Fluid.....(umbilical) .....
	Liver from.....to.....cm. below costal margin.....Rt. kidney.....
	Spleen.....palpable to....cm. below costal margin.....Lft. kidney.....
	Stomach.....Small intestine..... Appendix.....Cecum.....
	Colon.....Sigmoid.....Rectum.....Bladder.....Perineum .....
Genitals	Prepuce.....Testes.....Vagina.....Hernia..... .....Discharge .....
	Penis.....Scrotum.....Clitoris.....Hydrocele....Swelling .....
Back	Spine { Cervical.....Lumbar.....Deformity..... { Dorsal.....Sacral.....Rigidity..... D'Espine.....
Extremities	Arms { Rt..... Hands { Rt..... Vasomotor....Tenderness....Atrophy .... { Left..... { Left.....Trophic.....Swelling.....Hypertrophy
	Legs { Rt..... Feet { Rt..... Vasomotor....Tenderness....Atrophy .... { Left..... { Left.....Trophic.....Swelling.....Hypertrophy
Bones	Epiphyses.....Deformity..... Swelling.....
	Diaphyses.....Tenderness.....
Joints	Redness.....Tenderness.....
	Swelling.....Fluctuation.....
Muscles	Atrophy.....Fibrillation.....Paralysis..... Nodules..
Tendons	Hypertrophy....Tender points....Pseudoparalysis....Ganglion..... Shortening .
Neurologic	Skin reflexes....Pyramidal Pupillary reflexes....Mydriasis....Chvostek
	Tendon reflexes.....tract signs.....Clonus.....Gait.....Romberg.....
	Co-ordination.....Tremor of spread fingers.....Habit spasm.....
	Neuromuscular.....Tic.....Choreiform motions....Speech.....Other.....
Mental	Excitement.....Irritability.....Delusions.....Hallucinations .....
Endocrin Glands	.....Thyroid .....Other abnormalities.....
Urine	First morning spec.....Albumen
	Office spec.....Albumen
Blood	Hb. (Talquist).....
B. P.	Lying down.....Standing.....
Basal Metabolism	.....
	.....
Radiographs	.....Rt. wrist.....Left wrist.....

Special Examination (Half-page blank here)

Positive Findings (Full-page blank here)

Conditions of Examinations, and Procedure

Dr. Moore: "All examinations were made in my office (Hollywood Medical Group). Appointments were made for 10 and 11 A.M., and for 2 and 3 P.M. As nearly as possible the time on each was an hour, including the history. A work sheet was used and copy made at night. Sixty per cent of the examinations were made in the afternoon. First the history was taken, child not being present; then the physical examination was made, following the order of the examination blank. The child was stripped to the waist. Genitals were regularly inspected by me in case of the boys and by a nurse in case of the younger girls. The older girls were not examined in this respect."

Dr. Bronson: "Examinations were made daily each afternoon of the week, and on three forenoons. The average time, including write up, was nearer an hour and a half than an hour. The history was taken in the order called for in the blank and statements were written down at once, with remarks. Frequently additional facts in history were added during the examination. At the point of 'Habits' (in

history) the child started to undress. Urine specimen in office was obtained while child was undressing behind screen. The examination began with the child wrapped in a sheet, lying down. The back and extremities were examined in standing posture, young child nude, older with posterior view nude, except a few males (adults) who were not stripped. The order was as follows: general impression, skin, head, eyes, nose, neck, chest, abdomen, genitals, neurologic, mental, endocrine glands, urine, blood pressure, back, extremities, bones, joints, muscles and tendons, ears, mouth, blood. The child dressed just before the examination of ears and mouth."

Nearly all of Dr. Bronson's examinations were made in her private office in San Francisco, though a few were made in the psychological laboratory at Stanford University. Dr. Moore examined the children who lived in the vicinity of Los Angeles, Dr. Bronson those of the San Francisco Bay region. One extended conference of the physicians and advisory committee was held before the examinations began, and another after each physician had examined about 50 or 60 children. Unfortunately, owing to the distance by which the two centers are separated (500 miles) more frequent conferences were not possible. The data from the two sources are doubtless somewhat less comparable than they would have been had more frequent detailed comparison of procedure been possible.

General Impression

Apparent nutrition. Dr. Moore recorded in terms of actual weight, using Wood's scale. Dr. Bronson recorded according to personal impression, as she did not weigh the children. As the height-weight index has been treated in connection with the anthropometric measurements (Chapter VII) it did not seem worth while to present in any detail the records of the examining physicians on this point.

Dr. Moore reports 40 per cent of his boys as "normal," 29 per cent as overweight, and 31 per cent as underweight. Dr. Bronson reports 36 per cent of her boys as normal, 21 per cent as underweight, 12 per cent as "below par," sometimes adding such descriptive terms as "flabby," "nutrition poor," etc. She reports 20 per cent as overweight, 5 per cent as "undernourished," one with feminine distribution of fat, and 10 with indefinite description, as "nutrition only fair," etc.

Of the girls, Dr. Moore reports 31 per cent as normal, 34 per cent as underweight, and 35 per cent as overweight. Dr. Bronson reports 31 per cent as normal, 16 per cent as underweight, 6 per cent as "under par," 6 per cent as "undernourished," and 38 per cent as overweight.

According to the above figures, between a third and a quarter of these children are underweight or undernourished. The school reports, summarized in the preceding chapter, show 15.1 per cent with "fair" and 2.6 per cent with "poor" nutrition, as compared with 16.8 per cent "fair" and 7.2 per cent "poor" for a control group.

Facies. Dr. Moore reports 97.5 per cent of his cases as "normal," "bright," or "very bright" in appearance. Three cases are reported as "dull" in appearance, and 2 as having "adenoids facies." (All of these are boys.)

Dr. Bronson reports 95 per cent of her cases as "normal." She reports 9 cases of "adenoid facies," 2 with "circles under eyes," and 1 "facies of chronic intestinal indigestion." Two additional cases are underlined without description.

Color of skin. Dr. Moore reports one 7 year old girl as "very pale," one 13 year old girl as having "flushed cheeks," and one 9 year old boy as "pale," all others as normal.

Dr. Bronson reports 5 girls and 4 boys as "yellow" or "sallow," 2 girls as "florid," adding that one of these has "blue nails." She reports one girl and 7 boys as "pale," and underlines 2 other cases without description. All other cases are checked as "normal."

Color of mucous membrane. Checked as normal by both physicians in all cases.

Metabolism Tests

Dr. Moore secured metabolism tests of 93 subjects (47 boys and 46 girls) *selected at random* from the gifted group. The age distribution of these subjects was as follows:

Age	Boys	Girls	Total
6	1	0	1
7	0	1	1
8	2	5	7
9	3	2	5
10	6	9	15
11	10	13	23

Age	Boys	Girls	Total
12	14	9	23
13	9	4	13
14	2	3	5
Total	47	46	93

The tests were made by Mr. Calvin van Schaak, M.S., chemist and bacteriologist. The procedure is described by Dr. Moore as follows:

The subject was ordered to eat a light supper the evening previous to the test and report to the laboratory as conveniently as possible in the morning with no breakfast, medication, water or other intake of any kind. On arrival, careful inquiry was made regarding this point and the test was deferred in those instances in which there was acknowledgement that anything had been eaten. Inspection was then made for tight or uncomfortable clothing or hair arrangement, the bladder was emptied, temperature and pulse were noted, and the subject was then isolated at bed rest for at least thirty minutes under as quiet conditions as were possible in a busy group office. In most instances better control was established by keeping out parents and companions throughout the entire procedure once the subject was turned over to the laboratory.

Following this the subject was transferred to the metabolism room and put comfortably to rest; the metabolimeter was demonstrated on the operator and the procedure was explained in so far as it could be appreciated. In most subjects, confidence, relaxation, and enthusiasm, with a spice of competition, was obtained quite readily, and although there were a few who were somewhat hesitant when it came to the final steps, none was so apprehensive as to account for a marked pathologic rating. Those who showed definite instability were privileged to hold the mouth piece and nose clamp to themselves during the dummy test. The subjects were then allowed to rest alone until at ease and with a pulse rate practically the same as when it was first taken, usually in about 15 to 20 minutes. The test was then run for five minutes, after which a rest was allowed of from three to five minutes, depending on the subject. Some of the smaller subjects became tired and experience showed it best not to run the test in such cases longer than five minutes at a time. If this second test showed too great variance from the first, a third was made, but this was only essential in two or three instances. A few showed rates sufficiently high to warrant suspicion that food had been taken and these were repeated at a later date with more satisfactory results. A few frank abnormals were repeated but with practically the same readings on the check test.

All inquiries as to age and taking of height and weight were deferred until the tests were completed.

The Sanborn portable metabolimeter was used throughout, and careful attention was given to see that the soda-lime was fresh and dry and that leakage was avoided. The temperature of the water and

apparatus was noted before and after test, allowances were made for variations of barometric pressure, and a reliable stop watch was used for timing. The only outstanding difficulty encountered was due to inability to adapt the usual form of mouthpiece accompanying this instrument to some of the ill-formed mouths, necessitating special modifications.

The following standards were used for interpreting the rates:

Ages	Sex	Normal Standard Accepted
6 to 12	M & F	Benedict-Talbot
12 to 14	F	Benedict-Hendry
12 to 14	M	Modified DuBois

Careful consideration was given each individual case as to regularity of respiration, bodily movements, avoidance of test during premenses, unstability, etc.

The mean rating of the boys was 108.2 (S.D. 13.87); that of the girls, 111.9 (S.D. 14.12). Following are the numbers below 90, between 90 and 110, and above 110.

	Hyper (Above 110)		Normal (90–110)		Hypo (Below 90)	
	N	%	N	%	N	%
Boys	21	44.7%	22	46.8%	4	8.5%
Girls	29	63.0%	13	28.2%	4	8.8%
Total	50	53.8%	35	37.6%	8	8.6%

Dr. Moore writes: "I believe these figures to be fairly correct. The tests were made by a careful man who was interested in the work. The results seem to indicate that nearly all of these subjects are either normal or hypers as far as metabolism is concerned. Normal means within 10 per cent, either way, of the norm for age, height, and weight."

When the metabolism ratings of these 93 children were compared with their IQ's, no significant correlation was formed, although the average IQ was slightly higher for the hypo group than for either of the other groups. The figures are as follows:

	Hyper	Normal	Hypo
Mean IQ of boys	152.0	150.3	157.0
Mean IQ of girls	150.9	152.7	154.5

Skin

Conditions of the skin, including vasomotor disturbances, are summarized in the following table:

TABLE 70.

CONDITIONS OF THE SKIN

	Dr. Moore				Dr. Bronson			
	Boys		Girls		Boys		Girls	
Normal in	N	%	N	%	N	%	N	%
all respects	120	86.3%	121	85.2%	74	41.6%	37	28.0%
Eruption	5	3.6%	5	3.5%	22	12.4%	27	20.5%
Moist	4	2.3%	3	2.1%	7	3.9%	11	8.3%
Dry	0	—	0	—	32	18.0%	27	20.5%
Turgor	2	1.4%	1	0.7%	11	6.2%	7	5.3%
Sweat	2	1.4%	3	2.1%	30	16.9%	48	36.4%
Pigment	1	0.7%	0	—	3	1.7%	3	2.3%
Vasomotor	14	10.1%	15	10.6%	59	33.2%	73	55.3%
More than one condition	6	4.3%	3	2.1%	44	24.7%	65	49.3%

The amount of disagreement in the reports of the two physicians is very marked. Dr. Moore records 85.7 per cent of his cases as normal, Dr. Bronson 35.1 per cent. Whether slight acne is recorded as an eruption; whether slightly "clammy hands" is recorded as a vasomotor disturbance; whether skin that is somewhat moist or dry is recorded as abnormal, seems to be largely a matter of the personal equation.[1]

[1]Questions addressed to the physicians brought the following notes regarding standards.

Dr. Moore:

Eruption includes acne, eczema, and impetigo.
Moist, only when apparent to the touch.
Dry, only a scaly condition.
Turgor, normal unless a case of malnutrition.
Sweat, a tendency to perspire in droplets during examination.
Vasomotor, extreme redness or cyanosis of extremities."

Dr. Bronson:

Eruption. Pityriasis alba, due to exposure to sun, etc., is probably not so frequent in Bay region as in southern California. Acne vulgaris is common in adolescents. One instance of psoriasis.

Dry. Malnutrition, especially if due to a chronic illness, produces a dry, rough skin.

Turgor. Refers to tone or feeling of the flesh. It indicates water content; for example, in a diarrheal baby the tissue turgor is much diminished. It is not a term of much significance with older children.

Sweat. Not infrequently, especially in adolescents, the sweat dripped in the axilla during examination. This is most frequent in the "nervous" type.

Vasomotor. A good test for this is the "Tache cerebral." A line drawn with the nail across the chest produces a red mark which persists for a considerable time. Blushing is also a sign of vasomotor instability.

Head

Dr. Moore reports only 2 cases of abnormal shape of head; one 7 year old girl with "large" head, and one 11 year old boy with "long, narrow" head. He reports bosses for two 8 year old girls (identical twins). No other cases of abnormalities are reported by Dr. Moore for any of the items in this section.

Dr. Bronson reports 8 girls and 17 boys as having "squarish" heads, and 4 girls and 5 boys with other abnormalities of shape, making a total of 11 per cent with abnormalities of shape. She reports "oily," "dry," or "coarse" hair for 24 girls and 5 boys, or 9 per cent of her cases; depression of the fontanelle for 14 girls and 26 boys, and other abnormalities of the fontanelle for 4 girls, making a total of 44, or 14 per cent of all her cases; open sutures for one 11 year old boy and bosses for 13 girls and 18 boys, or 10 per cent of her cases; unhealthy scalp conditions for 19 girls and 12 boys, or 10 per cent of her cases. The latter conditions are recorded chiefly as "dandruff," "very dry," "very dirty," etc.

No significant age differences are noted in the reports of either physician.

Hearing

The watch test was used (ordinary Waltham watch). Distances were recorded, but because of varying acoustic conditions, noise in buildings, etc., these can be considered as only approximately correct. Each physician set a "normal" range for hearing, also ranges for rough groupings under the following heads: decidedly defective, somewhat subnormal, normal, superacuity.

No significant age differences were found.

Dr. Moore reports one boy as having decidedly defective hearing in both ears, and 2 girls as having decidedly defective hearing in one ear.

Dr. Bronson reports 2 boys with decidedly defective hearing in both ears, and one girl with decidedly defective hearing in one ear.

Dr. Moore reports 16 boys (11.5 per cent) and 26 girls (18.3 per cent) as having somewhat subnormal hearing in one or both ears; Dr. Bronson, 11 boys (6.2 per cent) and 5 girls (3.8 per cent).

Dr. Moore reports 122 boys (c .8 per cent) and 114 girls (80.3 per cent) as having normal or above average acuity of hearing in both ears; Dr. Bronson, 165 boys (92.7 per cent) and 126 girls (95.4 per cent).

The school reports only 2.3 per cent of gifted with hearing "somewhat defective," "poor," or "very poor," as compared with 5.9 per cent of the control group.

Ear Conditions

Examination of tympanic membrane was made by Dr. Moore in all cases except 7 boys and 8 girls. All of these had excellent hearing, hence percentages are based upon total groups. Membrane is reported normal for 133 or 95.7 per cent of the boys, and for 134 or 94.4 per cent of the girls. Abnormalities were recorded as follows:

Both drums dull, reflexes obliterated	1
Drums or canals obscured by wax	4
One or both drums retracted	5
" " " " thickened	2
" " " " dull	2

Dr. Moore reports one boy and one girl with scar left by mastoid operation, and one 10 year old boy as having "probable mastoid trouble" at present. He reports no cases of ear discharge.

Tympanic membrane was not examined by Dr. Bronson unless there was reason to suspect an abnormal condition. She notes abnormalities (drum thickened, wax in canal, dull reflexes, etc.) in 19 cases, 6 girls and 13 boys. Mastoid normal for all girls, 2 boys have scars as a result of operation. She reports 3 cases of ear discharge.

Vision

Dr. Moore tested the vision of all his subjects, using the Snellen chart. No attempt was made to determine the nature of the visual defects. Owing to lack of suitable office room, vision tests of Dr. Bronson's subjects had to be omitted. Below is a summary of the findings of Dr. Moore. In this summary, where the vision was unequal in the two eyes, the mean is used. There were 15 such cases among the boys and 21 among the girls.

TABLE 71.

VISUAL ACUITY

Visual acuity	Dr. Moore's subjects: Boys (139) N	Boys (139) %	Girls (142) N	Girls (142) %
Normal, better than 10/15	106	76.2%	107	75.3%
10/15	9	6.5%	18	12.7%
10/20	9	6.5%	5	3.5%
Total, 10/15 or less	33	23.7%	31	21.8%
Total, 10/20 or less	24	17.3%	13	9.2%
Total, 10/30 or less	15	10.8%	7	4.9%
Total, 10/100 or less	2	1.4%	1	0.7%

Of the 64 children with vision 10/15 or less (33 boys and 31 girls), 26 wear adequately corrective glasses. Several others wear glasses which do not correct, or have glasses which they do not wear.

The school reported 20 per cent of gifted group and 16 per cent of control group as having "subnormal" vision.

EYE DISORDERS

Both physicians regularly made note of eye conditions other than vision. Here again the personal equation of the examiner enters, as Dr. Bronson[1] reports four and a half times as many abnormal conditions as Dr. Moore.[2] In the summary given below, the sexes have been combined.

TABLE 72.

EYE DEFECTS OTHER THAN VISION

	Dr. Moore N	Dr. Moore Per cent	Dr. Bronson N	Dr. Bronson Per cent
Blepharitis	1	0.4%	24	7.8%
Conjunctivitis	10	3.6%	11	3.6%
Nystagmus	1	0.4%	6	1.9%
Persistent dilatation of pupils	0	—	14	4.5%
Styes	0	—	4	1.3%

[1]Dr. Bronson:
Blepharitis, a slight crusting of the eyelids is very common in children, especially in those under par or who have refractive error.
Dilatation of the pupils during examination with light in the face is another in which the cause was organic disease.
Strabismus, this is definite and the figures should be correct.

[2]Dr. Moore:
Blepharitis, not reported unless causing symptoms.
Strabismus, all cases reported showing any apparent deviation.
Conjunctival injection, very mild cases so common they were not reported.

	Dr. Moore		Dr. Bronson	
	N	Per cent	N	Per cent
Strabismus	2	0.7%	7	2.3%
Squint	0	—	2	0.6%
Granular lids	1	0.4%	1	0.3%
Chronic catarrhal condition	0	—	2	0.6%
Poor muscle control	0	—	1	0.3%
Scleritis	0	—	1	0.3%
Von Graefe's disease	0	—	1	0.3%
Purulent discharge (slight)	0	—	2	0.6%
Ptosis	2	0.7%	0	—
Total	17	—	76	—

Lips, Gums, and Tongue

Dr. Moore reports no abnormalities of lips, gums, or tongue.

Dr. Bronson reports lips normal in 78 per cent of her cases and "upper lip short" in 19 per cent. Gums are recorded as normal in 75 per cent of all her cases. Gingivitis is reported for 12 per cent, "spongy gums" for 5 per cent. In 8 per cent of her cases the gums are described as unhealthy," "sore," etc. One 12 year old boy is reported as having receding gums.

Abnormal conditions of the tongue are reported for 8 cases. These are: large papillae, 3; fissured, 2; coated, 2; large tongue, one.

Soft Palate

Dr. Moore reports no abnormalities for the girls of his group. In the case of one boy the soft palate is much elongated, in another narrow, and in another the uvula is missing.

Dr. Bronson describes the soft palate as "high and narrow" in 8 cases (4 girls, 4 boys); as "high" in 3 cases (one girl, 2 boys); as "broad" in 2 cases (one girl, one boy). One 10 year old boy has an extra uvula.

Hard Palate

Dr. Moore reports only one abnormality, this a high arch for an 11 year old boy.

Dr. Bronson reports a total of 116 abnormalities (47 girls and 69 boys), as follows:

	Boys	Girls	Total
Palate high and narrow	37	20	57
Palate narrow	6	8	14
Palate high	22	18	40
Palate broad and high	0	1	1
Palate broad and flat	1	0	1
Palate broad	2	0	2
Palate, no description	1	0	1
Total abnormalities	69	47	116
Per cent of total group	38.8	35.6	37.4

The above figures show that when two exceptionally competent and well-trained physicians examine the hard palates of children, one may report many times as many abnormalities as the other. We have no reason to suppose that abnormalities of hard palate are actually more numerous in the bay cities of California than in Los Angeles.

Second Dentition

The number of first teeth and permanent teeth was recorded by both physicians for each child. The following figures show the mean numbers for each age.

Table 73.

Progress of Second Dentition

Mean No. of	Dr. Moore				Dr. Bronson			
	Boys		Girls		Boys		Girls	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
2, 3, 4	20	0.	20.0	0.	20.0	0.	20.0	0.
5	18	3.7	20.0	1.0	19.0	1.0	—	—
6	13	9.7	18.6	4.6	17.5	4.3	18.0	4.0
7	15.1	7.4	12.9	9.6	8.3	12.3	13.8	8.6
8	12.6	11.0	10.5	12.0	11.9	10.6	10.6	12.3
9	10.8	12.8	9.3	13.9	10.3	13.1	7.5	16.1
10	9.4	13.8	6.4	18.0	6.3	16.6	5.5	18.3
11	4.5	20.5	2.3	23.9	4.2	20.6	1.8	23.4
12	1.9	24.3	2.1	24.8	0.7	25.8	0.7	26.0
13	0.5	26.4	0.2	27.3	2.0	24.0	0.3	26.8
14	0.	27.2	0.	28.0	0.	27.0	0.5	25.8
15, 16	0.	28.0	0.	28.0	—	—	0.	25.0

It will be noted that the sex differences in mean number of permanent teeth are not very marked. In Dr. Moore's group, the boys have the larger number of permanent teeth before age 7, and the girls a significantly larger number at 10 and 11. In Dr. Bronson's group, the boys have a slightly

larger number below 8, and the girls a larger number at 9, 10, and 11.

Condition of Teeth

Our summary here is for Dr. Moore's group only, as Dr. Bronson omits report for 54 of her 310 cases and statistics on the remainder would therefore be ambiguous.

Table 74.

Condition of the Teeth

	Per cent of children without cavities		Mean number of filled cavities		Mean number of unfilled cavities*	
	Boys	Girls	Boys	Girls	Boys	Girls
2, 3, 4	100.0%	80.0%				5.0
5	66.7%	100.0%			4.0	
6	0.0%	40.0%	4.0	0.3	0.3	3.0
7	71.4%	58.3%	3.5	0.8	1.5	1.2
8	11.1%	38.5%	1.5	2.4	1.4	1.4
9	25.0%	27.3%	2.3	2.5	0.6	0.8
10	33.3%	28.0%	1.4	1.3	1.1	1.7
11	17.2%	40.0%	2.7	1.0	0.7	1.4
12	25.9%	33.3%	2.1	2.3	1.1	0.8
13	57.1%	23.0%	2.8	3.4	0.5	0.6
14	20.0%	60.0%	2.0	3.0	1.0	2.5
15, 16	0.0%	50.0%	3.0	5.0	0.0	0.0

* For subjects having cavities.

The dental conditions of these children are very much better than have usually been reported for unselected school children. This is probably due in part to better habits of personal hygiene and to better dental care.

Nose

Nasal obstruction and peculiarity of nasal form were noted by both physicians, with the following results:

Table 75.

Frequency of Nasal Obstruction*

	Dr. Moore	Dr. Bronson
Alae-nasi (peculiarities of)	1.3%	
Mouth breathing type		9.6%

* Dr. Moore: "Only nasal obstructions causing symptoms were reported. Slight obstructions due to spurs or to minor deviations of septum were not considered important enough to record."

Dr. Bronson: "I think the proportion of nasal obstruction higher in the Bay region. I tested each nostril separately, and if child had to open the mouth to expire a *deep* inspiration, the case was counted as positive."

	Dr. Moore	Dr. Bronson
Negroid type		5.2%
Deviation of septum		0.4%
Nostrils short, wide or narrow	0.4%	9.3%
Obstruction	3.9%	17.0%
Discharge	7.3%	11.1%
Excoriation of nares		1.5%
Total	12.9%	54.1%

Note: Per cents are per cents of the total cases examined.

Pharynx and Tonsils

The two physicians have not recorded their examinations in the same manner. Dr. Bronson has reported the present condition of the pharyngeal cavity; Dr. Moore, the presence or absence of adenoids. Dr. Bronson does not, as a rule, report removal of adenoids.

Dr. Moore reports satisfactory removal of adenoids for 55.40 per cent of all boys, with imperfect removal in an additional 3.6 per cent of the cases. He reports 36.7 per cent of the cases as having no adenoids; and 3.6 per cent with adenoids which are large or pathological. He reports adenoids removed for 37.3 per cent of the girls, which includes one imperfect removal; none present in 57.0 per cent, and large or pathological adenoids in 5.6 per cent.

Dr. Bronson's figures for condition of pharynx are as follows:

	Boys	Girls
Normal	36.5%	40.9%
Granular	18.5%	21.2%
Catarrhal	17.4%	9.9%
Acutely inflamed	15.7%	18.2%
Underlined without explanation	11.8%	9.9%

The outstanding fact in Table 76 is the large number who have undergone tonsillectomy,—more than 50 per cent of the entire group. In this case the physicians agree fairly closely. The school reports about 44 per cent, the Home Blank about 49 per cent. Probably not more than 10 per cent of unselected school children in most cities of the United States have had tonsils removed.

TABLE 76.

CONDITION OF TONSILS

	Dr. Moore		Dr. Bronson	
Removed	Boys	Girls	Boys	Girls
Satisfactorily	56.1%	38.0%	43.3%	46.2%
Imperfectly	1.4%	0.7%	12.4%	12.1%
Total removed	57.5%	38.7%	55.7%	58.3%
Present				
Slightly enlarged but not pathological	2.2%	0.7%	4.5%	2.3%
Decidedly enlarged or cryptic[1]	30.2%	46.5%	11.2%	10.6%
Definitely pathological	4.3%	4.2%	3.9%	3.8%
Entirely normal[2]	5.8%	9.9%	18.0%	18.2%

[1]Not necessarily pathological, however.
[2]Of Dr. Bronson's cases, 6.8 per cent are underlined without explanation.

A striking fact in the above figures is the small proportion of tonsils not removed which are entirely normal.

CONDITION OF THYROID

Conditions of the thyroid were reported by the physicians as follows:

	Dr. Moore			Dr. Bronson		
	Boys	Girls	Total	Boys	Girls	Total
Normal	88.5%	83.1%	85.6%	90.0%	66.6%	80.0%
Slightly enlarged	4.3%	10.6%	7.6%	7.8%	23.5%	14.5%
Hyperthyroid	7.2%	6.3%	6.8%	2.2%	10.0%	5.5%

There were no cases of hyperthyroidism below 9 years, and only two cases of slightly enlarged thyroid below 8 years. The ages 10 to 13 show the highest incidence of thyroid trouble.

Dr. Bronson reports that army records show more than the usual amount of "adolescent" goitre in the Bay region, which is in harmony with the above figures.

In view of the possible influence of thyroid activity upon mental development, it is interesting to compare the IQ's of the hyperthyroid cases with those of the gifted group as a whole. There were 14 boys and 24 girls reported as showing appreciable hyperthyroid symptoms. These gave a mean IQ of 156 for the boys, (S.D. 13.5), and 146 for the girls (S.D. 18.9). Of the above 38 cases, 15 were recorded as true hyper-

thyroidism. These gave a mean IQ of 157 (S.D. 13.2). As the mean IQ for the entire gifted group is 152 (S.D. 10), the difference between the hyperthyroid cases and the total group is not statistically significant. Of course, it is necessary to bear in mind the fact that our gifted group, all of whom are within the top one per cent of the general school population, represents a very narrow range of intelligence as compared with unselected children, and that this might very well mask a true correlation of appreciable amount between intelligence and degree of thyroid activity. However, if the correlation were very large we would expect to find the percentage of hyperthyroid cases in our gifted group larger than it is. Comparative data on the frequency of hyperthyroidism among the general child population of the cities covered in the survey are, unfortunately, not available. Both Dr. Moore and Dr. Bronson are inclined to believe that it is probably somewhat lower than in our gifted group.

The expectation that the incidence of hyperthyroidism should be higher among the gifted than in the general population rests upon two facts: (1) the well-known connection between cretinism and thyroid deficiency; (2) the supposed relationship between thyroid activity and the production of the microsplanchnic and macrosplanchnic body types. The microsplanchnic type is believed to be associated with greater thyroid activity, and Naccarati finds that it also tends to be associated with greater intelligence.[1] It should be noted, however, that Naccarati claims but a small correlation between morphologic index and intelligence.

Condition of the Cervical Glands

Conditions of the cervical glands were reported as follows:

	Dr. Moore		Dr. Bronson	
	Boys	Girls	Boys	Girls
Glands normal	49.6%	61.3%	59.0%	57.6%
Enlarged, tonsils present	23.0%	28.8%	16.9%	20.4%
Enlarged, tonsils removed	27.4%	9.8%	21.9%	19.7%
Enlarged, no statement	—	—	2.2%	2.3%
Total enlarged	50.4%	38.7%	41.0%	42.4%

[1]Sante Naccarati: The Morphological Aspect of Intelligence, *Archives of Psychology*, 1921, p. 44.

The incidence of enlarged cervical glands showed no marked or consistent age differences. It will be noted that the reports of the two physicians agree fairly closely. Cornell makes the following statement regarding the incidence of enlarged cervical glands among the general school population: "Because of the great frequency of adenoids and decayed teeth in childhood the secondary effect, cervical adenitis, is correspondingly frequent, about three-fourths of young school children possessing palpable small glands or 'kernels'."[1] The proportion in our gifted group is a little over 40 per cent.

Chest Deformities

No statistics are more unsatisfactory than those that relate to the frequency of growth defects. One school physician may report several times as many as another in examining children of the same school population. The reason, of course, is the indefinite terminology used. Deviations from the ideal human form occur in every degree, and what degree shall be taken as worthy of notice is largely a matter of

Table 77.

Chest Deformities

	Dr. Moore			Dr. Bronson		
	Boys	Girls	Total	Boys	Girls	Total
Beading	14	7	21	67	39	106
Harrison's groove	27	6	33	91	58	149
Pigeon Chest	9	2	11	27	14	41
Shoemaker's breast	1	0	1	56	29	85
Miscellaneous	1	2	3	21	21	42
Total deformities	52	17	69	262	161	423
Duplications—more than one condition listed for the same child	20	3	23	134	77	211
Total cases with deformities	32	14	46	128	84	212
Per cent of group	23.0%	9.9%	16.4%	71.9%	63.6%	68.4%
Total cases normal	107	128	235	56	46	102
Per cent of group	77.0%	90.1%	83.6%	28.1%	36.4%	31.6%
Mean number of deformities per child	0.37	0.12	0.24	1.47	1.22	1.36

[1]Dr. Walter S. Cornell: *The Health and Medical Inspection of School Children*, 1912, p. 286.

subjective judgment. In Table 77 it will be seen that Dr. Moore reports 83.6 per cent of his cases as free from deformities of the chest, Dr. Bronson only 31.6 per cent. Dr. Moore reports an average of .24 deformities per child, Dr. Bronson 1.36.

Chest expansion was not measured. The intercostal angle was checked by Dr. Moore as normal in all cases. Dr. Bronson reports intercostal angle as follows:

	Boys	Girls
Obtuse	36.5%	50.0%
Acute	11.8%	15.9%
Right	50.6%	31.8%
No report	1.1%	2.3%

Respiration Rate

This was taken by Dr. Moore with child in sitting position; by Dr. Bronson with child in recumbent position. Both physicians took the record near the middle of the examination hour. The means and standard deviations by age are given below.

Table 78.

Mean Respiration Rate By Age and Sex

	Dr. Moore				Dr. Bronson			
	Boys		Girls		Boys		Girls	
	M	S. D.	M	S. D.	M	S. D.	M	S. D.
2–3–4	21.0	1.0	24.6	4.5	23.0	—	27.0	—
5	23.0	2.8	23.0	0.0	25.0	1.1	—	—
6	19.6	1.8	21.8	.8	24.6	.7	25.0	6.5
7	22.1	2.1	21.5	2.5	23.0	.6	23.8	0.9
8	19.2	1.3	22.1	3.3	22.0	2.4	23.8	2.3
9	19.8	2.4	22.0	3.2	22.2	3.0	22.5	2.9
10	20.1	1.5	18.2	1.5	20.9	2.4	22.5	2.0
11	18.8	1.4	18.6	1.7	21.8	2.5	20.9	2.3
12	18.7	1.7	19.2	1.3	20.5	2.2	19.9	2.2
13	18.2	1.9	18.7	2.5	20.6	2.4	20.1	2.9
14	18.6	1.4	18.2	.8	20.5	2.5	17.5	0.8
15–16	17.0	—	17.0	1.0	—	—	19.0	—

Dr. Moore's records for each sex run lower than those of Dr. Bronson at almost every age. This holds both for the mean and for the standard deviation. Since Dr. Moore's records were taken with child sitting, and Dr. Bronson's with child lying down, one would have expected a difference in

the opposite direction from that which was found.[1] It is possible that one examiner may arouse more excitement in the child than would be caused by another physician.

Table 78 shows a marked decrease in respiration rate with age, but no very consistent sex differences.

Lung Conditions

Dr. Moore reports one 11 year old girl with possible tubercular lesion, and 7 boys with abnormal percussion sounds. Of the latter group, he reports 2 as possibly due to chest deformity, one as due to an old pleurisy (negative to tuberculin test), another in which X-ray showed mottling and peribronchial thickening with some calcified glands (negative to tuberculin test), one with asthmatic condition, one which may be a case of latent tuberculosis, and one in which X-ray showed inactive tuberculosis. In another case X-ray of the chest showed some calcification and enlarged bronchial glands, so that there is a possibility of latent tuberculosis, although percussion sounds were normal and bovine tests were negative. Of his total cases, 96.8 per cent are checked as normal for all lung conditions.

Dr. Bronson reports rales or rhonchi for 8 girls and 21 boys. She finds no tubercular conditions, but reports one boy and one girl with generalized bronchitis, one girl and one boy as asthmatic, one girl with acute bronchitis, and one boy with bronchial asthma. Of her cases, 89.4 per cent are checked as normal for all lung conditions.

Heart

Dr. Moore reports 3 cases of functional cardiac murmur among boys, and 3 among the girls. He reports among boys 4 cases of abnormal heart rhythm (2 of arythmia, one extra systole, and one respiratory rhythm); among girls one case of arythmia and one in which the first sound is not clear. He records 95.7 per cent of all his cases as having normal heart conditions (exclusive of heart rate), and he reports no cases of serious heart trouble.

[1]Dr. Moore: "The count was usually for 30 seconds, and was often repeated."

Dr. Bronson: "Count taken for one-half minute, without patient's knowledge, and unless especially rapid not repeated."

Dr. Bronson reports one boy and 4 girls as having heart affections of probably congenital origin; one boy and one girl as having had heart affected by rheumatic fever (the girl is said to be well at present, except for a slight disturbance of the heart rhythm); one boy and 2 girls as having acquired heart disease from other causes; and 20 boys and 35 girls as having functional cardiac murmur. She reports disturbances of the heart rhythm for 17 boys and 17 girls. For all of these cases except two (both girls), the report is "respiratory rhythm," which she considers has a probable vasomotor origin. The other two cases are arythmia, one, and extra systole, one. She reports "very rapid" heart beat (128) for one girl, "first sounds rather poor" for 3 boys. She records 78.6 per cent of her boys and 59.8 per cent of her girls as normal for all heart conditions (exclusive of heart rate). In all, Dr. Bronson reports more than five times as many deviations from the normal for the heart as are reported by Dr. Moore.

Pulse Rate

The pulse rate was taken just before or just after respiration rate; by Dr. Moore with child sitting, by Dr. Bronson with child lying down. The distributions are irregular and the variability very high. For this reason the median and 10-90 percentile range are used instead of the mean and sigma. The range is not given for the ages 2 to 6 and 14 to 16, owing to the small number of cases at those ages.

Table 79.

Pulse Rate By Age and Sex

	Dr. Moore				Dr. Bronson			
	Boys		Girls		Boys		Girls	
	10–90 Percentile		10–90 Percentile		10–90 Percentile		10–90 Percentile	
Age	range	Median	range	Median	range	Median	range	Median
2–3–4		92		92		93		93
5		100		98		98		—
6		89		97		90		93
7		91		89		89		93
8		81	76–98	85	79–97	89	78–98	90
9	72–91	82	78–95	89	84–116	86	84–110	90

	Dr. Moore				Dr. Bronson			
	Boys		Girls		Boys		Girls	
	10–90 Percentile		10–90 Percentile		10–90 Percentile		10–90 Percentile	
Age	range	Median	range	Median	range	Median	range	Median
10	73–92	81	74–97	87	70–96	83	84–105	86
11	70–95	82	73–96	79	78–93	85	73–98	86
12	68–91	77	72–96	85	74–92	85	78–94	85
13	70–91	84	74–91	78	73–92	84	73–118	82
14		77		74		70		77
15–16		73		78		—		79

Table 79 indicates that there is a reduction of 12 or 15 in pulse rate from 6 to 14 years and that there are no marked or consistent sex differences. In general the figures agree fairly well with those for unselected children.

D'Espine Sign

The D'Espine sign refers to conditions of the bronchial glands. When subject with enlarged or calcified bronchial glands pronounces the vowel *e*, the sound is audible at lower vertebral positions than when the glands are normal. The stethoscope is used.

Physicians do not always agree on the limits of normality with respect to the D'Espine sign. Dr. Moore considers a D'Espine below the third dorsal as of possible significance. Dr. Bronson considers the condition normal if the D'Espine sign is not below the fourth dorsal; if at the fifth or sixth dorsal she considers the glands possibly enlarged; if at the seventh or below, definitely enlarged. Other physicians whom we have questioned have shown similar differences of opinion.

The following summary of findings for the gifted group shows a marked sex difference in favor of the girls. No consistent age differences were found. Comparative figures for unselected children are not available.

	Dr. Moore		Dr. Bronson	
	Boys	Girls	Boys	Girls
Not below fourth dorsal	58.0%	68.4%	65.7%	78.7%
Fifth or sixth dorsal	26.2%	20.4%	21.9%	12.9%
Below sixth dorsal	14.4%	9.9%	5.6%	4.6%
Not stated or indefinite	1.4%	1.4%	6.8%	3.8%

Abdomen

Dr. Moore[1] reports 89.2 per cent of his boys and 87.3 per cent of his girls as entirely normal so far as abdominal conditions are concerned. This includes 5 cases in which the appendix has been removed and recovery was normal. For 14 girls and 10 boys he reports the liver as more than 1½ cm. below costal margin. This condition is probably of little significance, since in no case was the liver more than 2 or 3 cm. below the costal margin. Three boys and one girl have tenderness over McBurney's point; one girl has pin worms in the rectum; one girl and one boy fecal masses in the colon, and one boy small external hemorrhoids.

Dr. Bronson[2] reports only 46.6 per cent of her boys and 51.5 per cent of her girls normal as regards abdominal conditions. For the remaining 159 cases she records a total of 265 abnormal conditions, relatively five times as many as are reported by Dr. Moore.[3] These are classified as follows:

	Girls (N = 178)	Boys (N = 132)	Total (N = 310)
Distention: Above umbilicus	4	14	18
Below "	3	0	3
Region not stated	23	46	69
Recti: Diastasis	15	31	46
Other abnormalities of recti	12	41	53
Fecal masses	7	12	19
Other abnormal conditions of intestines	1	6	7
Symptoms of chronic appendicitis	1	1	2
Hernia[3] at present	7	12	19
Hernia in infancy (umbilical)	4	6	10
Miscellaneous minor conditions	8	7	15
Liver more than 1½ cm. below costal margin	1	3	4
Total	86	179	265

Dr. Bronson reports appendix removed (with normal recovery) for 4 boys and 5 girls.

[1]Dr. Moore: "Examination on table with patient relaxed. Minor distention not considered. Separation of recti not reported unless very apparent."

[2]Dr. Bronson: "Slight diastasis of the recti with small hernial opening above or at umbilicus is very frequent. The 'postural' child usually has prominent abdomen. The standard I tried to follow was that used with Harvard students."

[3]Dr. Moore has reported hernia under *genitals*. He reports four cases; 2 of inguinal-scrotal and 2 scars from former hernia.

Genitals

Dr. Moore reports 94.2 per cent of his boys, and 38 per cent of the girls who were examined, as normal in all respects so far as the genitalia are concerned. However, examination of the girls was only made in 46 per cent of the cases. Of those examined abnormal conditions were found in 11 cases, or 16.9 per cent, but this should not be taken as representative, as examination was made in many cases because of suspected abnormal condition. The 11 cases all showed vaginal discharge as the active symptom. Microscopic examination of the smear was made in 8 of these cases, with negative results in 6. In one case diphthyroids were present; in one, streptococcus and micrococcus catarrhals.

For the boys he reports one case of undescended testicles, one of tight foreskin, one of infantile penis (12 year old boy), one case in which the testicles were inclined to retract into the ring. He reports 2 cases of inguinal-scrotal hernia and 2 cases with scars from former hernia. Of the boys 62.3 per cent have been circumcised.

Dr. Bronson reports 50.5 per cent of her boys and 52.9 per cent of her girls normal as regards genital conditions. Examination of the genitals was not made for 32.5 per cent of the girls, nor for 3.9 per cent of the boys. She reports 15 cases of undescended testicles (including cases of testicles in canals), and 8 additional cases in which the testes are either very small or very large. The scrotum is described as "very small" in 9 cases and "very large" in 4 cases. In 8 cases minor abnormalities of the penis are reported. In 15 cases the word *genitals* is underlined without explanation. 48.9 per cent of the boys have been circumcised.

Dr. Bronson reports abnormal conditions of the genitals for 7 girls (a total of 12 symptoms reported). This is 7.9 per cent of the number examined. Conditions were as follows:

Irritated condition of external genitalia	7
Large clitoris (hymen intact)	2
Circumcised because of smegma	1
Discharge, probably gonococcal[1]	1
Swelling of external genitalia	1

[1]Parents were advised to take this child to the family physician for treatment.

Spinal Deformities

Spinal deformities and defects of posture were reported as shown below:

Table 80.

Defects of Posture

	Dr. Moore		Dr. Bronson	
	Boys	Girls	Boys	Girls
Kyphosis:				
Slight	18.0%	16.2%	0.0%	1.5%
Moderate	10.1%	4.2%	3.9%	3.0%
Marked	6.5%	2.1%	0.0%	0.0%
Lordosis:				
Slight	0.7%	0.7%	3.4%	6.1%
Moderate	1.4%	2.1%	8.4%	11.4%
Marked	2.2%	0.0%	1.1%	2.3%
Scoliosis:				
Slight	4.3%	3.5%	6.7%	2.3%
Moderate	2.9%	0.7%	1.7%	1.5%
Marked	0.0%	0.7%	0.0%	0.0%
Fatigue posture:				
Slight	5.8%	2.8%	18.0%	12.1%
Moderate	9.4%	7.1%	15.7%	14.4%
Marked	3.6%	2.1%	12.3%	7.6%
Other abnormalities	—	—	3.9%	8.3%
Entirely normal	42.5%	61.2%	30.4%	33.3%

It seems that the differences between the reports of the two physicians are here due in part to a difference in nomenclature. Cases of the kind which Dr. Bronson records as fatigue posture are by Dr. Moore recorded as slight kyphosis. Dr. Moore reports somewhat more than Dr. Bronson as free from all kinds of spinal deformities. Both report only a small number of cases of "marked" defect. The literature of school hygiene contains innumerable reports on the percentage of school children having spinal deformities, but the results show such wide disagreement as hardly to be worth quoting. One of the most careful studies, that of Scholder, Weith and Combe of 2,314 school children of Lausanne, Switzerland, gave 24.6 per cent with scoliosis and 5.8 per cent with kyphosis or lordosis. The Lausanne figure for scoliosis is considerably higher than that found for our gifted.[1] On the other hand, statistics on spinal deformities

[1]Scholder, Weith and Combe: Les deviations de la colonne vertebrae dans les écoles de Lausanne. *Jahrb. der schweizerischen Gesellshaft f. Schulhygiene,* 1901. For other data on the incidence of growth disorders, see L. M. Terman, *The Hygiene of the School Child,* p. 73 ff.

in colleges not infrequently show from 60 per cent to 80 per cent with defects of posture. Lloyd T. Brown, for example, reports 80 per cent of Harvard freshmen as having "unsatisfactory" posture.[1]

Extremities

Dr. Bronson recorded 17 per cent of boys and 9 per cent of girls as having bow legs or knock knees in "moderate" degree; and 3.3 per cent of boys and 3.8 per cent of girls in "marked" degree. Dr. Moore reported no cases under this heading.

Dr. Moore records 10 per cent of boys and 12 per cent of girls as having either "beginning flat foot," "some pronation with low arches," or (three cases) "marked" flat foot. Dr. Bronson records 62 per cent of boys and 48 per cent of girls as having one of these conditions. However, pronation accounts for more than three-fourths of her positive cases. She records only 5 cases of "marked" flat foot in 310 subjects.

Dr. Moore reports 6 other children with minor abnormalities of the feet or legs, besides a serious case of arthritis deformans; Dr. Bronson, 22 additional cases, all minor except one showing after effects of infantile paralysis.

Dr. Moore reports one boy and one girl whose hands show some trophic disturbances; one girl whose arm and hand and leg muscles are atrophied from arthritis deformans; and one girl whose arm and hand are paralyzed from infantile paralysis. Dr. Bronson reports 16 boys and 13 girls with minor deformities of the arms or hands, such as "incurved fingers," "clubbed fingers," etc.

Subtracting duplications (more than one condition reported for the same child) only 18.5 per cent of Dr. Bronson's boys and 23.5 per cent of her girls are recorded entirely normal as regards extremities. Of Dr. Moore's cases, 87 per cent of boys and 84.5 per cent of girls are recorded as normal.[2]

[1]Lee, Geer and Brown: Bodily Mechanics in Harvard Freshmen. *American Phys. Ed. Rev.*, November, 1920.

[2]Dr. Moore: "In the case of bow legs and knock knees, slight variations from the normal were not reported. Flat feet reported only when the arch was actually fallen."

It should be noted that these classifications do not include vasomotor disturbances, all of which were tabulated under *skin*.

Bones

Dr. Moore[1] reports all boys as normal. He reports two girls (identical twins) as having deformities due to rickets, and three other girls with minor abnormalities of the bones. Dr. Bronson[2] reports 18.5 per cent of boys and 15.9 per cent of girls as having enlarged epiphyses or abnormalities of the diaphyses. The conditions here reported do not include those which have been reported under deformities of the chest, spine, extremities, etc.

X-ray photographs were secured by Dr. Moore for 57 gifted cases selected at random. The measurements of these by Dr. Baldwin have been presented in Chapter VII.

Joints

Dr. Moore[3] reports 100 per cent of his boys and 98.6 per cent of his girls as normal. Dr. Bronson[4] reports 32 per cent of her boys and 27.3 per cent of her girls as showing hypotonicity of joints. In addition she reports "loose elbow joints" for one boy, "loose knee joints probably due to displaced cartilage" for another, and "apparently no socket at right hip" for a third. One girl has the left femur out of socket, causing one inch shortening, and two have stiff finger joints. The word *joints* is underlined without explanation for 14 boys and 10 girls.

Muscles and Tendons

All of Dr. Moore's[5] boys and 97.9 per cent of his girls are

[1]Dr. Moore: "Only diseases of the bones were considered."

[2]Dr. Bronson: "Bone defects reported by me were mostly enlargements of the ends of long bones. These usually occur in those having chest deformities and slight knock knee or bow leg (more striking in severe rickets, of course)."

[3]Dr. Moore: "The normal tonicity varies so widely that only pathological cases were reported."

[4]Dr. Bronson: "Hypertonicity is certainly very frequent but perhaps not pathological. This depends on one's ideal of the human body."

[5]Dr. Moore: "Only atrophy and hypertrophy of pathological nature reported."

reported normal. Dr. Bronson[1] reports 70.2 per cent of her boys and 81.1 per cent of her girls as normal. Practically all the deviations from normal which she reports are minor conditions, described chiefly as "muscles not well developed," etc.

Neurologic Conditions

Neurologic conditions were reported as shown in Table 81.

Table 81.

Neurologic Conditions

	Dr. Moore		Dr. Bronson	
	Boys (N = 139)	Girls (N = 142)	Boys (N = 178)	Girls (N = 132)
Tendon reflexes:				
Moderately exaggerated	1	23	48	43
Markedly exaggerated	–	—	12	17
Sluggish or absent	1	1	—	—
Tremor of spread fingers:	2	32	—	—
Fine	–	—	62	48
Coarse	–	—	6	3
Striking	–	—	8	6
Tics or habit spasms	12	1	11	4
Chvostek	1	—	—	1
Mydriasis	–	—	19	23
Positive Romberg	–	—	32	14
Stuttering or Stammering	–	—	3	2
Coördination poor	–	—	27	16
Abnormal conditions recorded	17	57	228	177
Entirely normal	71.2%	71.1%	28.6%	24.2%

Here the differences between the two physicians are very great indeed. Nearly three times as many are reported entirely normal by Dr. Moore as by Dr. Bronson.[2] However, the physicians agree in finding tics and habit spasms far more frequent among boys than among girls. This is supported by the home and school data.

[1]Dr. Bronson: "It is hard to set a standard, but as a whole, my 'poor' cases will be those with diastasis of recti, hypotonicity, and other defects."

[2]Dr. Bronson: "Exaggerated reflexes, largely a matter of the personal equation. Tremor of spread fingers is present or not present; very many of us have it. 'Poor coördination' refers to inability to bring tips of the two forefingers together with the eyes shut. Mydriasis, pupils persistently dilated during the examination. These conditions can be present without organic disease. Most positives are in high-strung children, though not infrequently a phlegmatic child may show poor coördination."

Mental symptoms are reported as follows:

	Dr. Moore		Dr. Bronson	
	Boys	Girls	Boys	Girls
Excitable	3	3	35	29
Irritable	12	2	11	9
Excitable and irritable	1	1	7	8
Recorded as normal	89%	96%	70%	65%

Endocrine Symptoms

Dr. Moore reports for boys 14 other cases of possible endocrine disturbances, such as overweight, tremor of spread fingers, etc., and for girls, 16 cases. Dr. Bronson reports 9 cases of possible endocrine disorder among boys, and 19 among girls. In all, 8.2 per cent of the gifted boys and 11.3 per cent of the gifted girls are reported as having endocrine symptoms.

Condition of Urine

The procedure followed by the two physicians is indicated in the following statements.

Dr. Moore: "Albumen test, with 3 per cent acetic acid; a few drops in cold urine, then gently heated to the boil to differentiate nuclear and serum albumen and the phosphates. A few drops of the acid added during the heating process. Sugar test with Benedict's Solution. Indican test (not called for in examination schedule) with HCL, $KCLO_3$ and chloroform."

Dr. Bronson: "Two specimens, one brought from home; first, morning specimen; other, office specimen. Trace of albumen in office specimen might easily be less frequent, because a rather large proportion of my patients were examined in the morning, except on Saturdays. The procedure followed in testing was as follows:

1. Heat urine to boiling—look for cloudiness.
2. Add about ½ to 1 c.c. of dilute 5 per cent acetic acid. Heat again and look for cloudiness in heated portion.

Albumen in p.m. specimen does not mean kidney disease. It most frequently occurs in cases of extreme lordosis and is due to interference with the circulation in the left kidney only."

TABLE 82.

RESULTS OF URINE TESTS

	Dr. Moore		Dr. Bronson	
	Boys	Girls	Boys	Girls
Normal	69.0%	65.5%	83.1%	74.2%
Orthostatic	13.7%	16.9%	14.6%	16.7%
Sugar	0.0%	0.7%	Not tested	
Indicanuria:				
Slight	2.9%	4.2%	"	"
Moderate	10.8%	4.9%	"	"
Marked or extreme	5.7%	12.0%	"	"
Other conditions	0.0%	4.9%	2.2%	9.1%

Under "other conditions" Dr. Moore reports the following cases, all among girls:

1 case true albumenuria with granular cast
1, slight true albumenuria
1, true albumenuria
2, excess pus cells
1, few hyalin casts
1, numerous granular casts.

Under "other conditions" Dr. Bronson reports as follows:

For boys:

1, heavy trace of albumin, acid 1018, few white blood corpuscles
1, slight cloud with sediment, both specimens
1, question of true albumenuria
1, acid, Turbid 1010, pus and epithelial cells.

For girls:

1, albumin in afternoon specimen and pear-shaped epithelial cells
1, probably true albuminuria with urates
1, albumin and pus cells in afternoon specimen
1, 1 to 2 white blood corpuscles to each field
1, heavy albumin in afternoon, little in morning; pus and epithelial cells
1, both specimens albumin with pus
1, albumin in afternoon, and acid 1012
1, clump of pus cells, a little albumin sediment; later test showed no albumin after removal of pus
1, albumin in afternoon and square epithelial cells
1, 1 to 2 pus cells to each high power field; trace of albumin and acid in both specimens
1, light cloud of albumin afternoon and morning, much mucous and square epithelial cells, few white blood corpuscles
1, square epithelial cells.

Hemoglobin

The Talquist test was used. Procedure is indicated in the following comments.

Dr. Moore: "The book used was one patented June, 1902, and sold by Edw. Pennock, Philadelphia. The second drop was used and read as soon as dry, usually in 20 or 30 seconds."

Dr. Bronson: "Alas! there are several firms putting out Talquists. Mine is the authorized, signed Talquist. It is a color reading, and even in the acid-hematin method, which takes a lot of blood and time, the standard in hospitals is always varying."

The lack of objectivity in the hemoglobin test is indicated in Table 83, in which it will be noted that Dr. Moore reports only about 1 per cent as below 75, as compared with approximately 25 per cent reported by Dr. Bronson.

Dr. Moore's records were made in such figures as 79, 83, etc.; Dr. Bronson's in round numbers by intervals of ten, as 60, 70, 80, etc. In order to allow comparisons, Dr. Moore's data have also been grouped in intervals of ten.

Table 83.

Results of Hemoglobin Tests

	Dr. Moore		Dr. Bronson	
	Boys	Girls	Boys	Girls
Below 65	0.0%	0.0%	0.6%	0.8%
65–75	1.4%	0.7%	23.6%	26.5%
75–85	70.5%	76.1%	64.6%	61.4%
85 or above	26.6%	22.5%	6.7%	8.3%
Not examined	1.4%	0.7%	4.3%	3.0%

Blood Pressure

Dr. Moore: "The first half of the cases were done with arm at side, both lying and standing. The last half with arms extended, both lying and standing. In the former, I often found a rise in pressure on standing, in the latter usually a fall."

Dr. Bronson: "I took the pressure until constant, with child lying down. Then child got off the table and I took the pressure again quickly, this time with patient's arm extended toward me or on my knee (in the case of youngest

Table 84.

Blood Pressure by Age (in m.m.)

	Boys						Girls					
	Dr. Moore			Dr. Bronson			Dr. Moore			Dr. Bronson		
	yrs. 5–8	yrs. 9–11	yrs. 12–15	yrs. 5–8	yrs. 9–11	yrs. 12–15	yrs. 5–8	yrs. 9–11	yrs. 12–15	yrs. 5–8	yrs. 9–11	yrs. 12–15
	N = 22	N = 65	N = 49	N = 27	N = 105	N = 43	N = 32	N = 66	N = 38	N = 15	N = 64	N = 51
Lying down:												
N	22	65	49	27	105	43	32	66	38	15	64	51
Mean	103.59	109.31	113.94	99.41	105.95	111.89	100.44	109.12	115.16	94.34	106.06	115.04
S.D.	8.58	9.77	9.08	9.37	8.33	13.14	8.70	9.66	13.37	6.16	11.28	10.10
Standing; arm extended:												
N	6	21	18	27	105	43	13	22	21	15	64	51
Mean	92.50	105.81	110.06	97.56	104.24	111.07	100.46	103.59	111.53	94.00	104.81	116.90
S.D.	4.33	12.14	10.43	8.86	10.62	12.91	10.45	10.16	10.90	10.30	12.93	13.85
Standing, arm at side:												
N	16	44	31				19	44	17			
Mean	106.06	110.75	117.33				99.90	111.32	118.47			
S.D.	12.08	9.42	9.07				8.64	11.33	13.74			
Difference:												
N	22	65	49	27	105	43	32	66	38	15	64	51
Mean	4.73	4.54	4.66	5.71	6.44	6.54	3.41	5.11	4.90	5.67	7.00	7.88
S.D.	2.91	3.50	3.22	2.92	3.89	3.64	3.12	3.35	3.22	3.86	4.05	5.12

Note. Difference refers to difference between lying and standing records.

patients who did not hold arm steady). I think the effect of position is of little significance as a test of vasomotor stability. A few seconds in getting the second reading makes much difference, especially in children."

The blood pressure records are summarized in Table 84.

Table 84 shows no marked or consistent differences between mean records found by the two physicians. The only consistent sex difference is the tendency of girls to a slightly higher average blood pressure at the ages 12 to 15. The increase with age is marked, as would be expected. In the records of Dr. Moore's boys, recumbent position, the (Pearson) correlation of blood pressure with age was .41. In four comparisons out of ten (Table 84) the S. D. is significantly greater for the age group 12 to 15 than for the age group 9 to 12, and in only one case significantly lower.

The following comparative data, for girls, are taken from Burlage:[1]

TABLE 85.

BLOOD PRESSURE NORMS FOR ITHACA SCHOOL GIRLS
(Systolic Readings. Sitting Position)

Age	Cases	Means (m.m.)	Means for Gifted Girls (Recumbent position)	
			Dr. Moore	Dr. Bronson
9	65	104.85		
10	77	108.69	109.12	106.06
11	122	109.48		
12	92	114.16		
13	100	118.55	115.16	115.04
14	90	123.71		
15	116	123.29		
16	75	118.92		
17	121	115.41		
18	175	111.65		

Note. The averages for our gifted girls of 9 to 12 years, and 12 to 15 years, are added for comparison.

Blood pressure records are likely to be considerably affected by the emotional factor. Excitement may increase the readings by as much as 30 m.m. The records of Burlage were apparently obtained under very favorable conditions. The nurse and school physician who took the records were

[1]Stanley R. Burlage: The Blood Pressure and Heart Rate of Girls during Adolescence. *Amer. J. of Physiology*, April, 1923.

known to the children and it was felt that the emotional factor was reduced to a minimum. Burlage's records run a little higher than those for our gifted group for ages 12 to 15, but slightly lower for ages 9 to 12. The conclusion seems to be warranted that gifted children show no significant deviation from unselected children with respect to blood pressure.

Summary

Medical examinations were given to 783 gifted children, of whom 591 belonged to the main experimental group. The data for these 591 cases have been analyzed, yielding the following results, among others:

1. Tests show 6 cases (about 1 per cent) with "decidedly defective" hearing and approximately 10 per cent with hearing "somewhat defective."

2. Vision tests show 10.8 per cent of boys and 4.9 per cent of girls with 10/30 vision or less.

3. The mean number of permanent teeth present at eight years is approximately 11 for boys and 12 for girls. This is perhaps slightly better than normal. The mean number before 8 years is higher for boys than for girls; after 8 it is appreciably higher for girls.

4. Between the ages of 8 and 13 years one or more dental cavities (filled or unfilled) are found in the case of about three-fourths of the boys and two-thirds of the girls. In this age range the mean number of unfilled cavities per child is approximately one.

5. Somewhat more than half of the entire group have undergone tonsillectomy. Only about a fourth of the remaining subjects have tonsils which are entirely normal.

6. Hyperthyroidism is found in 6.1 per cent of cases. In this group there is no significant correlation between hyperthyroidism and IQ.

7. Approximately 43 per cent of the subjects have enlarged cervical glands.

8. About one-half of one per cent showed symptoms of active or probably active tuberculosis.

9. Mean respiration rate decreases from 21 at age 8 to 18 at age 13, according to Mr. Moore's records. Dr. Bronson's records show a decrease from 23 to 20 in the same period.

10. Mean pulse rate decreases from 83 at 8 years to 81 at

13, according to Dr. Moore's records, and from 89 to 83 according to Dr. Bronson's.

11. Dr. Moore records the D'Espine sign as present below the sixth dorsal (indicating enlargement of the bronchial glands) in 14.4 per cent of boys and 9.9 per cent of girls. Dr. Bronson's figures are 5.6 per cent for boys and 4.6 per cent for girls.

12. Abnormalities of the genitals were rare.

13. Urine tests gave results entirely normal in two-thirds of Dr. Moore's subjects and in three-fourths of Dr. Bronson's. There was only one case of marked sugar content. Indicanuria was present in approximately 9 per cent of the cases tested.

14. Using the Talquist hemoglobin test, Dr. Moore finds about 99 per cent of his subjects above 75. The corresponding figure for Dr. Bronson is approximately 74 per cent. This difference may be partly accounted for by the greater amount of sunshine in Los Angeles, where Dr. Moore's subjects reside.

15. Metabolism tests of 93 random cases, chiefly from 10 to 13 years of age, showed 91.4 per cent normal or above.

16. The blood pressure records agree closely at all ages with the norms of Burlage for unselected children in Ithaca, New York. For the ages 9 to 12 they are slightly higher than Burlage's and from 12 to 15 slightly lower.

17. Marked kyphosis is reported for 2 per cent of the subjects, marked lordosis for 1.3 per cent and marked scoliosis for but one subject.

18. Comparison of the records of the two physicians shows that the personal equation enters largely into the reports upon skin conditions, eye conditions (other than vision), conditions of the lips, gums and tongue, abnormalities of the hard palate, deformities, heart disease, D'Espine sign, nervous symptoms, and hemoglobin. Respiration and pulse records are also subject to constant error due to the personal equation, but to a less degree. On some of the points mentioned in this paragraph one highly competent examiner will report several times as many cases of defect as another examiner of equal competence. Medical examination methods are less objective than those customarily employed by psychologists in psychometrics.

19. Notwithstanding occasional disagreements in their results, the examining physicians are in accord in the belief that on the whole the children of this group are physically superior to unselected children of corresponding age in the school population.

Dr. Moore: "In regard to a general comparison of this group with unselected children, it is my opinion that major and minor defects are much less common in the former. I do not have suitable figures on which to base a comparison as to the relative incidence of various defects, but I have a strong conviction that, other things being equal, there is a direct correlation between physical health and mentality in children when studied in groups. In my opinion the physical superiority of the gifted group is indicated by the higher average of nutrition and by superior stability, physical and mental."

Dr. Bronson: "The examinations of the gifted group were the most satisfactory of any series of examinations I have conducted. The quickness of these children in comprehending what was desired of them in the various tests was a delight. As a whole there was unusual ability to concentrate attention, and self consciousness was less noticeable than in the average child. The home care, cleanliness, and health habits, such as diet, hours of sleep, etc., indicated superior intelligence on the part of the parents. There were, of course, exceptions to all these points. Physically, also, the gifted child ranked above the average child of the community. Interest in games and outdoor sports was, I should judge, about the same as that of the ordinary child. The greater number of the defects recorded in my reports were minor in degree and such as are found in all civilized peoples. If our standard were as strict as that which we apply to blooded stock, we would find physical perfection in the human race very rare after early infancy."

CHAPTER X

SCHOOL PROGRESS AND EDUCATIONAL HISTORY[1]

Age-Grade Status

From tables 86 and 88, showing age-grade status at the time the children were located, it will be seen that if we use the commonly accepted standard and call a child retarded who has reached the age of 8 years and is below the second grade, or 9 years and is below the third grade, etc., then there is not a single child in the gifted group of 616 who is retarded. Even if we use a standard which is stricter by a half year there is still only one retarded. If we call each child accelerated who has reached the low first grade and is not yet 6 years old, the high first and is not yet 6½, the low second and is not yet 7, etc., then 84.5 per cent of the boys and 82.5 per cent of the girls must be classified as accelerated. The per cent of acceleration increases relatively little after the age of 7 years, which means that most of the extra gain is made before that age.

Tables 87 and 89 show the status of the same 616 children in relation to *mental* age. Here the situation is strikingly reversed. If we now call a child retarded who has reached the mental age of 7½ years and is below the second grade, 8½ years and is below the third grade, etc., then all but 4 of the boys and all but 2 of the girls are retarded.

Table 90 gives the distributions of chronological ages and mental ages by even ages and even grades for the sexes combined. In this case the lines indicate the somewhat more conservative norms of grade location used by Ayres, Strayer, and others. Even on this basis, all but 12 of the children are below the grade normal for mental age, while not one is retarded with respect to chronological age. It will be noted that the discrepancy between mean chronological age and mean mental age is 2.8 years in the first grade, and that by the fifth grade the discrepancy is increased to nearly 5 years.

[1]Written with the assistance of Florence L. Goodenough.

TABLE 86.

AGE-GRADE DISTRIBUTION OF BOYS

Age	1L	1H	2L	2H	3L	3H	4L	4H	5L	5H	6L	6H	7L	7H	8L	8H	9L	9H
5	1																	
5–6	1	1																
6	2	1	1	1														
6–6	1	3	3	1	2													
7		1	1	6	2	1	1											
7–6				2	3	7	3			1								
8				1	2	9	3	3										
8–6					1		12	6	6									
9							3	5	3	4	4	1						
9–6						1	1	9	15	12	2	1	1					
10								1	4	13	8	6	3	1				
10–6									1	2	12	12	4	6	1			
11											4	9	12	8	3	1		1
11–6											1	3	4	10	4	1		
12													2	7	6	6	2	
12–6															8	4	1	
13														1	3	3	1	1
13–6																2	2	
Total	5	6	5	11	10	18	23	24	29	32	31	32	26	33	25	17	6	2

TABLE 87.

MENTAL AGE AND GRADE DISTRIBUTION OF BOYS

Mental Age	1L	1H	2L	2H	3L	3H	4L	4H	5L	5H	6L	6H	7L	7H	8L	8H	9L	9H
7	1																	
7–6																		
8	1	1																
8–6		1		1														
9	2	2	1		1													
9–6		1	1	1	1													
10		1	1	2			1											
10–6	1		2	2	1	2	1											
11				4	3	2	1											
11–6					2	2	2											
12				1	1	2	4	2	1									
12–6					1	5	2	6				1						
13							4	3	3	2	1	1						
13–6						3	4	4	6	4	1							
14						2	1	4	5	6	3							
14–6							3	3	7	5	1	2		1				
15									2	8	3	9	3	1				
15–6								1	2	5	8	5	6	2				
16								1	3	2	7	6	4	6	2			
16–6											3	4	4	9	2	3	1	
17											2	2	4	6	5	4	1	1
17–6											1	2		3	6	1	1	
18											1		4	4	3	4	1	
18–6															6	4		
19														1	1		2	1
19–6													1			1		
Total	5	6	5	11	10	18	23	24	29	32	31	32	26	33	25	17	6	2

TABLE 88.

AGE-GRADE DISTRIBUTION OF GIRLS

ge	1L	1H	2L	2H	3L	3H	4L	4H	5L	5H	6L	6H	7L	7H	8L	8H	9L	9H	10L
	1																		
–6	1																		
	1	4	2	1															
–6	1	2		4	2	1													
			1	4	3	1	1												
–6					3	3	4												
					1	6	6	6	1	1									
–6					9	2	3	8	4										
						1	2	5	6	4	1	1							
–6							1	4	6	5	3	4							
									3	8	5	8	2						
–6										4	7	6	7	3					
											6	7	12	4	1	1			
–6												1	7	3	4	3	1		
													2	4	4	4	1		
–6													2	2	7	6	2	1	
														1		4	1	1	
–6																3	2		1
otal	4	6	3	9	18	14	17	23	20	22	22	27	32	17	16	21	7	2	1

TABLE 89.

MENTAL AGE AND GRADE DISTRIBUTION OF GIRLS

ental ge	1L	1H	2L	2H	3L	3H	4L	4H	5L	5H	6L	6H	7L	7H	8L	8H	9L	9H	10L
7	1																		
7–6	1																		
8																			
8–6	1	2																	
9	1	3	1	2															
9–6				2	1														
0		1	2	3	3		1												
0–6				1	4														
1				1	9	4	3												
1–6					1	3	2	4											
2							3	2	3	1									
2–6						4	1		1	1									
3						2	2	4	6		1								
3–6							1	4	3	3	1								
4						1	3	3	2	4	2	2							
4–6							1	3		2	4	4							
5								2	4	7	2	4	1						
5–6								1	1	1	4	5	4	3					
6										1	6	4	7	3		1			
6–6											2	4	7	3	1	2	1		
7												3	5	4	5	4	1		
7–6										2		1	1	2	4	4	1		
8													5	2	5	3	3	1	
8–6													1		1	7			1
9																	1	1	
9–6													1						
otal	4	6	3	9	18	14	17	23	20	22	22	27	32	17	16	21	7	2	1

TABLE 90.

SUMMARY OF GRADE LOCATION BY AGE AND MENTAL AGE

	GRADE																	
	1		2		3		4		5		6		7		8		9	
Age	CA	MA	CA	MA	CA	MA	CA	MA	CA	MA	CA	MA	CA	MA	CA	MA	CA	MA
5	5																	
6	15		9		5													
7	1	3	16		23		9		1									
8		6	3	1	30		47		12									
9		9		8	2	3	30		55		17		1					
10		3		13		10	1	3	35		64		26		1			
11				5		26		12			31		60		18		2	
12				1		13		20		7		1	19		45		7	
13						5		26		27		5	2		15		8	
14						3		21		31		18		1				
15								4		30		40		20				
16								1		6		36		43		11		2
17										2		11		25		33		5
18												1		16		33		5
19														3		2		5
Mean CA	6.3		7.3		8.1		8.8		9.7		10.4		11.5		12.4		12.8	
Mean MA		9.1		10.4		12.0		13.3		14.6		15.8		16.9		17.8		18.3
Differ'nce	2.8 yrs.		3.1 yrs.		3.9 yrs.		4.5 yrs.		4.9 yrs.		5.4 yrs.		5.4 yrs.		5.4 yrs.		5.5 yrs.	

Note. Lines show normal grade location according to the standards used by Ayres, Strayer, and others.

School Progress Quotient

By comparing the age of a child who is in a given grade with the average or median age of the school population in that grade, it is possible to compute a school progress quotient. This was done for all of our gifted children who were enrolled in school grades above the kindergarten at the time of the test. The standard of comparison used was the median ages of the children enrolled in various grades of Oakland in 1921–1922, at mid-term. These standard ages were as follows:

Grade:	L1	H1	L2	H2	L3	H3	L4	H4	L5	H5
Mdn. Age:	6–5	7–3	7–8	8–2	8–9	9–2	9–10	10–3	10–10	11–5
Grade:	L6	H6	L7	H7	L8	H8*	L9*	H9*	L10*	H10*
Mdn. Age:	11–11	12–4	12–10	13–3	13–10	14–4	14–10	15–4	15–10	16–4

* Projected norms.

The progress quotient (P.Q.) of a given child is obtained by dividing the standard age for the child's grade by the child's age reckoned as of the middle of the term. The P.Q. distributions are given in Table 91.

Table 91.

School Progress Quotients of Gifted Children

P.Q.	Boys	Girls	Total
135–139	4	3	7
130–134	6	4	10
125–129	14	16	30
120–124	34	49	83
115–119	81	51	132
110–114	109	88	197
105–109	64	55	119
100–104	19	15	34
95– 99	4	0	4
Total	335	281	616
Mean P.Q.	113.8	114.5	114.1
S.D.	7.1	7.1	7.1
Mean IQ (for comparison)	149.2	148.4	148.5
S.D. of IQ	8.8	9.4	

The average progress quotient of 114 means that the typical gifted child is accelerated in school, as compared with unselected children, to an extent equal to 14 per cent of his age. This would amount to about one grade of acceleration at age 7, or two grades at age 14. It will be noted that the amount of acceleration of the gifted group reckoned thus is somewhat greater than that indicated by the net gain from skipping. (See page 273.) This difference is largely accounted for by the earlier entering age of gifted children as compared with normal.

The typical gifted child is about 48 per cent of his age above the norm in intelligence and about 14 per cent of his age above the norm in grade location. The difference between 48 per cent and 14 per cent is 34 per cent. From one point of view we might say that the typical gifted child is under-promoted to the extent of 34 per cent, or approximately one-third, of his age. This would mean a retardation of three grades at age 9, and four grades at age 12. It is, of course, conceivable that considerations having to do with social training justify a good deal of under-promotion of gifted children, but as far as mere *ability to accomplish* is concerned, it will be shown (in Chapter XI) that some two-thirds of the under-promotion found with this group is unjustified.

Teacher's Ratings on Quality of School Work

The School Blank which was filled out for the gifted, and also for a control group of unselected children of the ages 8 to 13, asked for a rating of the child's work in each school subject.[1] It will be recalled that the children of this control group were selected from the schools attended by the gifted children, and on the arbitrary basis which required that they be of exactly normal age-grade status. The ratings were secured by the use of the following instructions:

[1]Control Group A, described on pp. 177–178.

Compare this child's school work with that of the average child of the SAME SCHOOL GRADE, and rate its quality for all the subjects named below WHICH ARE BEING PURSUED. Rate also application and deportment. On the line before each subject, write the figure 1, 2, 3, 4, 5, 6, or 7.

1 = Very superior to average child of the same grade.
2 = Superior to average child of the same grade.
3 = High average.
4 = Average.
5 = Low average.
6 = Inferior to average child of the same grade.
7 = Very inferior to average child of the same grade.

ATTITUDE TOWARD SCHOOL
.....Application
.....Deportment

ART, ETC.
.....Drawing (free hand)
.....Modeling
.....Music (instrumental)
.....Music (singing)
.....Painting, water colors, etc.

ENGLISH
.....Composition
.....Debating or speaking
.....Dramatics
.....Grammar
.....Literature
.....Penmanship
.....Reading
.....Spelling

FOREIGN LANGUAGE
.....French
.....German
.....Latin
.....Spanish

HISTORY
.....Ancient or medieval
.....Civics or citizenship
.....United States history

MATHEMATICS
.....Algebra
.....Arithmetic
.....Geometry
.....Trigonometry

PHYSICAL EDUCATION
.....Folk dancing
.....Games and sports
.....Military training
.....Physical training

PRACTICAL SUBJECTS
.....Agriculture
.....Bookkeeping
.....Cooking
.....Manual training
.....Mechanical drawing
.....Sewing
.....Shop work
.....Typewriting

SCIENCE
.....Botany
.....Chemistry
.....General science
.....Geography
.....Nature study
.....Physical geography
.....Physics
.....Physiology or hygiene
.....Zoology

Here, rate any other subjects the child is taking which are not named above.....

Mean ratings were worked out for all ages, and for the sexes separately, to see whether there was any tendency for ratings to increase or decrease with successive years of chronological age. As no such tendency could be observed, ages were combined. However, only the 8 to 13 year old gifted children were included, as these were the only ages represented in the control group. Table 92 gives the age mean for each school subject for each sex and intelligence group. It will be remembered that the plan called for ratings ranging from 1 (high) to 7 (low), with 4 as representing work of average quality.

The school subjects were then listed again in order of greatest difference between the mean ratings for the gifted and the control groups. (Table 93). In the difference values an abrupt break will be noted after number 15 (agriculture). The subjects preceding this are those which call primarily for abstract thought, or (as in the case of

TABLE 92.

MEAN RATINGS ON SCHOOL WORK IN THE VARIOUS SUBJECTS

Subject	Gifted Boys	Gifted Girls	Control Boys	Control Girls	All Gifted	All Control
Drawing	3.76	3.42	4.07	3.72	3.62	3.87
Modeling	3.54	3.33	3.62	3.66	3.48	3.64
Instrumental music	3.07	2.73	3.46	3.31	2.89	3.38
Singing	3.67	2.87	4.13	3.65	3.24	3.89
Painting	3.85	3.54	3.94	3.68	3.71	3.80
Composition	2.36	3.09	3.95	3.91	2.25	3.93
Debating or speaking	2.00	2.09	3.84	3.94	2.04	3.88
Dramatics	2.57	2.25	3.76	3.52	2.40	3.64
Grammar	2.39	2.09	3.94	3.58	2.25	3.76
Literature	1.98	1.79	3.64	3.46	1.90	3.56
Penmanship	4.17	3.29	4.27	3.57	3.79	3.92
Reading	2.02	1.79	3.15	3.38	1.92	3.26
Spelling	2.28	1.94	3.58	3.19	2.13	3.39
Ancient history	1.98	2.12	3.53	3.68	2.04	3.60
Civics or citizenship	2.18	2.05	3.41	3.62	2.12	3.49
U. S. History	1.90	2.36	3.72	4.20	2.11	3.92
Arithmetic	2.53	2.51	3.83	3.76	2.52	3.80
Folk dancing	3.64	2.54	4.15	3.10	2.86	3.45
Games and sports	3.57	3.22	3.54	3.50	3.41	3.52
Physical training	3.41	3.02	3.74	3.44	3.25	3.60
Agriculture	3.30	3.20	3.95	4.00	3.28	3.96
Cooking	—	3.06	—	3.63	3.06	3.63
Manual training	3.49	—	3.60	—	3.49	3.60
Sewing	—	3.11	—	3.41	3.11	3.41
Shop work	3.57	—	3.50	—	3.57	3.50
General Science	2.51	2.05	3.66	3.89	2.34	3.78
Geography	2.17	2.36	3.60	3.73	2.26	3.67
Nature Study	2.49	2.72	3.61	3.71	2.57	3.66
Physiology and Hygiene	2.68	2.78	3.04	3.55	2.72	3.28
General Average[1]	2.78	2.54	3.80	3.58	2.68	3.69
Application	2.19	2.37	3.56	3.06	2.27	3.31
Deportment	2.53	2.13	3.42	2.70	2.36	3.08

[1]The "general average" is the mean of all the ratings given to the children of each group.

public speaking and dramatics) self-confidence, the ability to adapt oneself to changing circumstances, and quickness of mental processes.

TABLE 93.

ORDER OF SCHOOL SUBJECTS WITH RESPECT TO DIFFERENCE IN QUALITY OF WORK OF GIFTED AND CONTROL GROUPS

Subject	All Gifted	All Control	Difference
1. Debating or Speaking	2.04	3.88	1.84
2. U. S. History	2.11	3.92	1.81
3. Composition	2.25	3.93	1.68
4. Literature	1.90	3.56	1.66
5. Ancient History	2.04	3.60	1.56
6. Grammar	2.25	3.76	1.51
7. General Science	2.35	3.78	1.43
8. Geography	2.26	3.67	1.41
9. Civics or Citizenship	2.12	3.49	1.37
10. Reading	1.92	3.26	1.34
11. Arithmetic	2.52	3.80	1.28
12. Spelling	2.13	3.39	1.26
13. Dramatics	2.40	3.64	1.24
14. Nature Study	2.57	3.66	1.09
15. Agriculture	3.28	3.96	.69
16. Singing	3.24	3.89	.65
17. Folk Dancing	2.86	3.45	.59
18. Cooking	3.06	3.63	.57
19. Physiology or Hygiene	2.72	3.28	.56
20. Instrumental Music	2.89	3.38	.49
21. Physical Training	3.25	3.60	.35
22. Sewing	3.11	3.41	.30
23. Drawing	3.62	3.87	.25
24. Modeling	3.48	3.64	.16
25. Penmanship	3.79	3.92	.13
26. Games and Sports	3.41	3.52	.11
27. Manual Training	3.49	3.60	.11
28. Painting	3.71	3.80	.09
29. Shop Work	3.57	3.50	−.07

It is clear that gifted children do work of superior quality in those subjects which require abstract thought, but they do only slightly better than average in those subjects which depend primarily upon manual dexterity or special talent. Even in these subjects, however, they excel the control group to some extent. It is a little surprising that reading and arithmetic do not rank somewhat higher than they do in amount of difference shown between gifted and control groups.

In the above comparisons it should be remembered that the rating is made in comparison with other children of the same school grade, which ordinarily means that the gifted child is being compared with children one or two years older. This should more than counterbalance any possible "halo effect" entering into the ratings.

Correlations (Pearson r's) between the various groups were computed for mean ratings earned in the different subjects. In working these correlations when the sexes were compared, cooking was paired with shop work, and manual training with sewing. The results are as follows:

Gifted boys vs. gifted girls	.891 ±.025
" " " control girls	−.258 ±.111
" " " control boys	.305 ±.116
Control boys vs. control girls	.204 ±.124
" " " gifted girls	.279 ±.120
Gifted girls vs. control girls	.073 ±.165
Total gifted vs. total control	.207 ±.124

The striking fact is the high correlation between gifted boys and gifted girls (.891), as compared with the low correlation for all other pairs. Giftedness is evidently far more potent than sex in determining relative success in the different school subjects.

Table 94 shows for each subject the per cent of ratings which were high (1 or 2) and the per cent which were low (6 or 7). As would be expected, the differences between gifted and control are more obvious in the extremes than in the means.

Additional information on subjects in which weakness was shown was obtained from the question given below:

If child is especially weak in any subjects, give reason, if any reason is known to you. School Blank: II, 8.

The following per cents were reported weak in one or more subjects: Gifted boys, 22 per cent; gifted girls, 15 per cent; control boys, 30 per cent; control girls, 18 per cent. The gifted are weakest in the subjects which require manual dexterity. Writing, art, and hand work account for 68 per cent of the weaknesses reported for the gifted, as against 16 per cent for the control. The control children are most often weak in the subjects requiring abstract thought. Arithmetic, reading, English, and history account for 61 per cent of the

TABLE 94.

PER CENT OF HIGH AND LOW RATINGS ON SCHOOL WORK IN THE VARIOUS SUBJECTS

(Per cents of ratings given on each subject, *not* per cents of children)

	All gifted			All control		
	N	1 or 2	6 or 7	N	1 or 2	6 or 7
1. Debating or Speaking	215	69.3	0	114	11.4	5.3
2. United States History	272	64.3	0.4	192	12.5	6.3
3. Composition	441	60.8	0.2	369	11.7	5.4
4. Literature	301	71.8	0	187	17.1	3.2
5. Ancient History	102	66.7	0	63	19.0	12.7
6. Grammar	319	60.8	0.3	216	9.7	2.8
7. General Science	63	54.0	0	28	3.6	0
8. Geography	337	57.6	0	264	9.8	3.8
9. Civics or Citizenship	107	65.4	0	57	14.0	1.8
10. Reading	501	74.3	0.4	472	20.8	4.4
11. Arithmetic	479	51.4	0.6	446	11.7	4.7
12. Spelling	488	64.1	0.4	489	20.2	3.7
13. Dramatics	123	57.7	1.6	80	12.5	2.5
14. Nature Study	207	42.5	0	225	8.4	1.8
15. Agriculture	35	31.4	2.9	55	3.6	1.8
16. Singing	397	27.2	6.3	420	12.6	6.0
17. Folk Dancing	75	40.0	1.3	68	27.9	4.4
18. Cooking	88	29.5	0	77	18.2	0
19. Physiology and Hygiene	39	46.2	0	36	8.3	0
20. Instrumental Music	128	40.6	0.8	106	25.4	3.8
21. Physical Training	389	25.4	3.1	361	14.4	2.8
22. Sewing	107	27.1	0	115	26.1	1.7
23. Drawing	452	18.4	5.8	447	12.8	6.0
24. Modeling	41	17.1	4.9	39	25.6	2.6
25. Penmanship	488	18.0	8.0	437	10.8	9.2
26. Games and Sports	225	23.6	4.9	257	14.4	1.6
27. Manual Training	166	19.9	5.4	122	15.6	2.5
28. Painting	234	15.8	6.4	189	12.7	4.8
29. Shop Work	30	26.7	3.3	30	16.7	3.3

weaknesses reported for the control, as against 17 per cent for the gifted. Girls more often than boys were weak in arithmetic and history, and boys more often than girls in art and reading. This agrees fairly well with the distribution of low ratings in Table 94. The number of weaknesses reported was not large enough to give reliable rank orders of the subjects for the sex and intelligence groups.[1]

[1]Additional data in Chapter XII on strength and weakness of gifted children in the different school subjects.

The reasons given by teachers for weakness in the various subjects were tabulated separately for the gifted and control groups by sex and subject, as follows:

	Gifted	Control
Coördination poor (manual subjects)	14	4
Health or other physical handicap	13	15
Lack of application	11	15
Lack of interest	7	8
Nervousness	6	4
Inadequate previous training	5	9
Carelessness	4	4
Skipped grades	4	2
Youthfulness (in games, etc.)	4	1
Lack of special talent (as in music)	3	1
Dislike of subject	2	2
Speech defect	1	3
Inaccuracy	1	2
Lack of concentration or poor memory	0	3
Language handicap	0	6
Miscellaneous	0	2

Is child's mental ability very even, ordinarily even, rather uneven, very uneven? (Underline.) Home Blank: II, 20. School Blank: IV, 2.

TABLE 95.

EVENNESS OF ABILITY

	Very even	Ordinarily even	Rather uneven	Very uneven	Number reported
Gifted boys, Home Blank	73.6%	24.1%	1.6%	0.6%	311
Gifted girls, " "	78.9%	19.9%	0.8%	0.4%	261
Total, " "	76.0%	22.7%	1.2%	0.5%	572
Gifted boys, School Blank	71.7%	21.4%	3.3%	3.6%	304
Gifted girls, " "	72.0%	23.2%	4.1%	0.8%	246
Total, " "	71.8%	22.0%	3.6%	2.0%	550
Control boys, School Blank	22.3%	66.0%	10.5%	1.2%	256
Control girls, " "	35.0%	56.0%	8.2%	0.8%	243
Total, " "	28.5%	61.1%	9.4%	1.0%	499

Outstanding facts in the above table are the following:

(1) A high percentage of gifted, as compared with the control, are rated as "very even." The ratio is almost three to one.

(2) The school rates, 5.6 per cent of the gifted, as compared with 10.4 per cent of the control, as either "rather un-

even" or "very uneven." This is in the ratio approximately of one to two.

(3) Girls are rated as "very even" more often than boys, and somewhat less often as very uneven.

(4) The ratings of school and home on the gifted agree very closely with regard to numbers reported in each category.

The above data have only suggestive value, as many discrepancies and inconsistencies were found. In Chapter XII it is shown on the basis of test results that gifted children have about the same tendency to unevenness as unselected children of corresponding school grade or of corresponding mental age.

Question IV, 3 in the School Blank, and II, 21 in the Home Blank, asking in what respects ability was especially strong or especially weak, was so frequently misunderstood that the results could not be used.

Could child do school work of average quality if promoted to a higher grade now and given a certain amount of coaching on the subject matter skipped? . . . If so, in what grade as highest? . . . School Blank: II, 5. The results are given in Table 96.

TABLE 96.

EXTRA PROMOTION MERITED

(Teacher's judgments)

Group	No. Reported	Per cent that could be advanced various numbers of half grades						Average amount of deserved promotion
		"Yes"	1	2	3	4	5	
Gifted Boys	269	84%	38.3%	30.9%	4.8%	1.9%	0	1.3 Half grades
Gifted Girls	217	79.3%	36.4%	23%	5.5%	1.8%	0.9%	1.2 " "
Control Boys	239	36%	28.4%	6.7%	0.4%	0	0	0.4 " "
Control Girls	228	44.3%	32.0%	9.2%	0	0	0	0.5 " "
All Gifted	486	81.9%	37.4%	27.4%	5.2%	1.9%	0.4%	1.3 " "
All Control	467	40.5%	30.2%	7.9%	0.2%	0	0	0.5 " "

The most striking facts brought out are (1) that in the judgment of the teachers, 82 per cent of the gifted group are prepared to do the work of a higher grade, as compared with 40 per cent of the control group; (2) that the extra grade advancement which these 82 per cent of gifted children are said to merit, is 1.4 half grades, or about three-

quarters of a grade. The corresponding figure for the 40 per cent of control children who are said to merit extra promotion is .5 of a half-grade, or one quarter of a grade.

If over-promotion had also been taken account of, the difference between the two groups would have been even more pronounced. The teachers were not asked to report on those children who, in their opinion, were already advanced beyond their ability. Since of the gifted group 82 per cent are reported able to do work of a higher grade, while of the control group only slightly over 40 per cent are so reported, it follows that (to take an extreme illustration) even if no children were correctly graded, only 18 per cent of the gifted group could be graded too high, while of the control group nearly 60 per cent might be.

Educational History

The data on educational history have come chiefly from the Home Information Blank, which devoted two pages to the subject. Such reports cannot, of course, be taken as entirely accurate for individual children, but for the group as a whole they are believed to be fairly dependable. There is every evidence that as a rule the blanks were filled out with painstaking conscientiousness. In some of the blanks a few of the questions were not answered, but the per cent of total for whom a question is answered is usually 85 per cent and 95 per cent. As the Home Blank was not filled out for a control group, the only comparative data available are such as may be found in educational literature.

It will be understood that the figures given in the following pages relate to the 643 children of the main experimental group.

Did child attend kindergarten? . . . When and how long? Home Blank: II, 1. Reports for 314 boys and 258 girls. Answer is "yes" for 62.4 per cent of boys and 60.1 per cent of girls. Of 351 who had attended kindergarten, the length of attendance was stated for all except 14. The mean length of attendance was 5.9 months for boys and 5.5 months for girls. This is slightly more than half a school year.

Age of entering school (above kindergarten) . . . Grade first entered . . . Home Blank: II, 2. The first part of this item was answered for 541 cases, the second part for 533.

As shown in Table 97, the mean age of entrance was about 6¼ years.

TABLE 97.

AGE OF ENTERING SCHOOL AND GRADE FIRST ENTERED*

Age of entering school, above kindergarten		Grade first entered	
Age	No. Cases	Grade	Cases
4–0 to 4–11	13	1 L	421
5–0 to 5–11	154	1 H	57
6–0 to 6–11	328	2 L	26
7–0 to 7–11	39	2 H	12
8–0 to 8–11	6	3 L	5
9–0 to 9–11	0	3 H	5
10–0 to 10–11	1	4 L	5
		5 L	1
Total	541	4 H	1
		Total	533

*For age, median is 6 yrs., 3.79 mos.; mean is 6 yrs., 3.24 mos.; S. D. is 7.28 mos. For grade, median is .63 and mean is .44 of the distance through the low first; S. D. is 1.12 half grades.

Name and location of schools child has attended, including kindergarten. Home Blank: II, 5. The ranges and means of the number of schools attended by children of the different ages, sexes combined, are as follows:

Age	5	6	7	8	9	10	11	12	13
Range	1–3	1–4	1–4	1–4	1–6	1–7	1–11	1–7	1–6
Mean	1.53	1.46	1.70	2.07	2.43	2.67	3.14	3.29	3.54

The one child who had attended eleven different schools (in six different cities and three different states) was, at the age of eleven years three months, finishing the work of the low seventh grade with decidedly better than average standing in all major subjects. His poorest work according to the teacher's report is in writing and physical training, in each of which he is graded as "low average." He has attended school above kindergarten a total of five years and has skipped three half grades. He did not learn to read before starting to school, and has had no home instruction in any of the regular school subjects, although for the past five years he has had private lessons in French in addition to his school work. The teacher reports that he might safely be advanced another half year in school. Such cases (there

were several others almost as striking as this one) suggest that change of schools, which is so often reported in educational literature as one of the main causes of retardation, may be a very minor factor compared with native ability. Gifted children are doubtless able to adapt themselves more readily than normal children to a new environment, and it is even possible that the benefits which the children of our group have received from such changes, in the way of broadened experience and interest, outweigh the usual disadvantages. This might not be true of normal children.

The data on name and location of schools attended were secured primarily for use in the special study of individual cases and need not be summarized here.

Average number of school days missed in a year (rough estimate). . . Any long absences? . . . How long? . . . Reasons for irregularity. . . . Home Blank: II, 6. The results are as follows for the average estimated number of days missed:

	Boys	Girls	Total
No. for whom answered	238	201	439
Total range of days missed	0–80	0–70	0–80
Median	9.65	9.05	9.35
Mean	13.45	11.10	12.39
S. D.	13.75	10.05	12.25

The question regarding long absences was answered for 521 cases. For 55 per cent of these it is reported that no long absences have occurred. For 45 per cent, absences varying in length from two weeks to one and a half years are reported. Of long absences reported, the length of 22 per cent is not stated. In 57 per cent of the cases the absence was less than three months; in 15 per cent from three to six months; and in 6 per cent over six months. A slightly higher percentage of long absences is reported for boys than for girls.

Reasons for irregularity are given in 223 cases, as follows:

Reason	No. Cases	Per cent
Illness (personal)	178	76.4
Illness in family	7	3.0
Travelling	30	12.9
Change of schools	6	2.6
Ahead of class	3	1.3
Miscellaneous	9	3.8

Has attendance been very regular, fairly regular, rather irregular, very irregular? (Underline.) School Blank: IV, 7. The data from this question are available for the control group as well as for the gifted. The results showed no significant differences between gifted and control or between boys and girls.

	Cases reported	Very regular	Fairly regular	Rather irreg.	Very irreg.
Control Boys	245	72%	22%	4%	1%
" Girls	263	74%	21%	3%	2%
Gifted Boys	312	79%	14%	5%	2%
" Girls	263	80%	15%	3%	2%

Liking for school: very strong, fairly strong, slight liking, positive dislike. (Underline.) If school has been disliked at any time, why? . . . . Home Blank: II, 7.

	No. reported	Very strong	Fairly strong	Slight liking	Positive dislike
Gifted Boys	310	54.5%	39.4%	5.2%	1.0%
" Girls	254	70.1%	26.7%	2.4%	0.8%
All Gifted	564	61.5%	33.7%	3.9%	0.9%

Only 5 of the 564 children in the gifted group are reported as positively disliking school. Very strong liking for school is more common among girls than among boys. The reasons for dislike, however, disclosed no sex difference. The following reasons are reported:

Reason	No. of times reported
Disliked teacher	39
Daily monotony	8
Change of school	3
Work too elementary	6
Work too difficult	2
Timidity	2
Miscellaneous, including distance from school, overcrowded conditions, "prefers to play," "dislikes compulsion", etc.	18

These seem to be entirely normal reasons.

Describe child's attitude toward school. School Blank: II, 7. In order to treat the heterogeneous mass of descriptive matter included under answers to this question, it was necessary to condense and categorize the replies. In deciding upon categories the principle followed was, first, to adhere

to the original wording wherever possible, and, secondly, where answers were too long to permit this, to select the key word of the sentence (an adjective as a rule) and categorize under this. The responses to this question are probably quite as much subjective as objective, and indicate the teacher's attitude toward the children as much as the children's attitude toward school and the teacher. They are none the less interesting on this account. It will be noted (Table 98) that the sex difference is somewhat greater than the intellectual difference. Other points of interest are:

(1) The excess of gifted over control described as excellent, enthusiastic, eager to excel, or inattentive;

(2) The excess of control over gifted described as lacking interest or showing unsatisfactory attitude;

(3) That undesirable attitudes are twice as prevalent in the control group as in the gifted group;

(4) That no gifted girls are described as inattentive, but that five gifted boys are so described.

TABLE 98.

ATTITUDE TOWARD SCHOOL, AS DESCRIBED BY TEACHERS

	Gifted Group			Control Group		
	Boys	Girls	Total	Boys	Girls	Total
Desirable attitudes						
Conscientious	12	4	16	5	6	11
Interested	130	104	234	92	115	207
Excellent	25	34	59	13	17	30
Coöperative	6	2	8	5	3	8
Enthusiastic	5	14	19	4	3	7
Eager to excel	6	9	15	3	5	8
Studious	11	5	16	3	7	10
Happy	3	9	12	8	10	18
Excellent work with normal play interest	2	1	3	0	0	0
Good	30	20	50	37	31	68
Normal	17	16	33	20	10	30
Fairly interested	0	0	0	0	3	3
Total with desirable attitudes	247	218	465	190	210	400
Number in each group	271	227	498	236	227	463
Per cent showing desirable attitude	91.1%	96.0%	93.4%	80.5%	92.5%	86.4%

	Gifted Group			Control Group		
	Boys	Girls	Total	Boys	Girls	Total
Undesirable attitudes						
Lacks interest	10	6	16	34	15	49
Reticent	3	0	3	0	1	1
Inattentive	5	0	5	0	0	0
Mischievous	1	0	1	0	0	0
Conceited and lazy	2	1	3	3	0	3
Attitude poor	1	0	1	8	0	8
Spoiled	1	0	1	0	0	0
"Self-satisfied"	1	1	2	0	0	0
Precocious	0	1	1	0	0	0
Sullen	0	0	0	1	0	1
Dislikes school	0	0	0	0	1	1
Total undesirable attitude	24	9	33	46	17	63
Number in each group	271	227	498	236	227	463
Per cent showing undesirable attitude	8.9%	4.0%	6.6%	19.5%	7.5%	13.6%

Relative proportions showing undesirable attitudes:

	Ratios
Gifted boys, control boys	1 to 2.2
Gifted girls, control girls	1 to 1.9
Gifted group, control group	1 to 2.1
Gifted girls, gifted boys	1 to 2.2
Control girls, control boys	1 to 2.6

Did child learn to read before starting to school? . . . At what age? . . . How (amount and kind of help)? . . . Home Blank: II, 12. Of 300 boys for whom report was made, 44.3 per cent learned to read before starting to school; of 252 girls, 46.4 per cent. The more or less exact age of learning to read is reported for 246 cases. (Table 99).

Probably the way in which the question is worded accounts for the fact that less than half the parents gave the age of learning to read. For the most part those who reported that the child did not learn to read before starting to school, did not answer the second part of the question. Since so little precise information is obtainable as to how long a period elapses after entering school before the *average* child may be said to have learned to read, and still less in-

TABLE 99.

AGE OF LEARNING TO READ

Age	Boys	Girls	Total
1–0 to 1–5	1	0	1
1–6 to 1–11	1	0	1
2–0 to 2–5	2	2	4
2–6 to 2–11	1	2	3
3–0 to 3–5	8	6	14
3–6 to 3–11	8	3	11
4–0 to 4–5	25	28	53
4–6 to 4–11	15	11	26
5–0 to 5–5	53	40	93
5–6 to 5–11	10	11	21
6–0 to 6–5	7	9	16
6–6 to 6–11	1	0	1
7–0 to 7–5	0	1	1
7–6 to 7–11	0	1	1
Total	132	114	246

formation as to what would be the corresponding time for *gifted* children, any statistical work based upon such information as we have would be extremely inaccurate. We can say, however, that *at least* 113 (20.5 per cent) of the 552 children learned to read before the age of 5; 34 (6.1 per cent) before 4; and 9 (1.6 per cent) before 3.

On the last part of the question (amount and kind of help) answers were received for 197 children. (This question applies only to the children who are reported as having learned to read before entering school.) In a large majority of cases, only incidental or casual assistance is reported. In 5 cases the child had a private tutor, in no case for more than a half hour daily. In 17 cases the child is said to have "taught himself" without the knowledge of any member of the family, until it was suddenly discovered that the child could read. "By playing with books, pictures, or newspapers" is a rather frequent answer. Very informal assistance from some member of the household, usually the mother, is reported for 129 cases. In many cases it is specified that this help was given only in response to urgent solicitations on the part of the child.

Underline each half grade skipped: 1B, 1A, 2B, 2A, 3B, 3A, 4B, 4A, 5B, 5A, 6B, 6A, 7B, 7A, 8B, 8A. Home Blank: II, 3.

Underline each half grade repeated: 1B, 1A, 2B, 2A, 3B, 3A, 4B, 4A, 5B, 5A, 6B, 6A, 7B, 7A, 8B, 8A. Home Blank: II, 4.

	Boys	Girls	Total
Number of cases reported	301	249	550
Per cent who have skipped	82.7	85.9	84.9
Per cent who have repeated	3.7	4.4	4.0
Mean net gain in half grades	1.91	2.17	2.03
Median " " " " "	1.10	1.38	1.24

The mean net acceleration is based upon the number of half grades skipped minus the number repeated. From the following figures it will be seen that the mean net acceleration increases very little after the age of 7 years.

Age	6	7	8	9	10	11	12	13	All ages
Mean net acceleration, Boys	0.67	1.84	1.93	1.84	2.05	2.42	1.92	1.08	1.91
Mean net acceleration, Girls	0.69	1.62	1.86	2.53	2.40	2.56	2.72	2.32	2.17
Maximum net acceleration, Boys	3	8	7	7	6	2	5	4	8
Maximum net acceleration, Girls	3	4	5	8	5	6	10	5	10

The important fact in the above figures is that the average net gain by skipping amounts to only about one school grade, and that nearly all of this gain is made before the age of eight years. After eight years the net gain is more likely to increase with girls than with boys. The above figures agree very well with the data presented in the first section of this chapter.

Have you encouraged the child to forge ahead in school, allowed him to go his own pace, or held him back? . . . . Why? . . . . Home Blank: II, 9. This question was answered by 550 parents, of whom 396 gave reasons for their attitude. The data are as follows:

Have encouraged child to forge ahead	106, or 19.3%
Have allowed child to go his own pace	392, or 71.3%
Have held child back	52, or 9.4%

Reasons given for encouraging rapid progress:	
Realize necessity of education	16
Natural parental interest	15
Dislike laggards	9
Want him to like school	7
To keep him busy mentally	4
To make up for absences	1
Work too elementary to stimulate interest	1
To encourage ambition	1
Reasons given for allowing own pace:	
Forcing unnecessary	149
Do not believe in forcing	52
Believe in normal development	1
Youth	36
Health	14
Afraid to interfere	27
Mother busy, no time to supervise	2
Parents do not speak English	1
Want him to like school	5
To develop individuality	3
Poor instruction made rapid progress inadvisable	1
Social problems (no explanation)	1
Reasons given for holding child back:	
Youth	12
Afraid of overstrain	15
Health	14
Advice of school authorities	5
Child stutters	1
To give more time for recreation	1
To work in manual training	1
To keep in school near home	1

There may possibly be some significance in the fact that only 51 per cent of the first group give a reason for the course which they report they have followed, as compared with 75 per cent of the second group and 96 per cent of the third group. It is clear, however, that the large majority of our subjects have not been subjected to "hothouse" methods and that this factor does not account for their school acceleration or for their high score in the intelligence test.

Average number of HOURS A WEEK devoted to HOME STUDY of school lessons during the last year. Home Blank: II, 8. Reports were received for 271 boys and 221 girls. Tables 100 and 101 give the results separately by age and sex. It is interesting to note the marked sex difference and

the large number of cases in the zero column. It would appear that home study has not played a very large part in the almost universally good school records of these children. The mean for the entire group is less than two hours a week. The variability, however, is unusually large. In general the girls do more than twice as much home study as the boys.

TABLE 100.

HOURS A WEEK IN HOME STUDY OF SCHOOL LESSONS
(GIFTED BOYS)

Age	Hours 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	No. cases	Mean
5	5																5	0.
6	11	1	1														13	0.15
7	13	3	2		1		1										20	0.68
8	24	4	3	1	1												33	0.38
9	27	8	7	5	2			1	1								51	0.94
10	21	11	5	6	3	5	3	1								1	56	1.76
11	13	10	10	10	1	3	4	1			1						53	1.89
12	8	7	2	5		5	1	2		1							31	2.21
13		1	2	1	1	1	2				1						9	3.63
Total	122	45	32	28	9	14	11	5	1	1	2					1	271	1.39

Limits of groups—Zero indicates no home study.
1—Indicates any amount up to and including one hour.
2—Indicates from one up to and including two hours, etc.

TABLE 101.

HOURS A WEEK IN HOME STUDY OF SCHOOL LESSONS
(GIFTED GIRLS)

Age	Hours 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	No. cases	Mean
5																	0	
6	9			1		1											11	0.64
7	16		1	1													18	0.25
8	14	5	3	2	1	1	1				2		1				30	1.86
9	19	6	3	5	1	1			1		1						37	1.08
10	11	3	10	2	2	5	2	2					2			1	40	2.81
11	9	8	5	7	2	2	3	3							1		40	2.36
12	7	1	7	3	1	3	2		2		3	1	1				31	3.61
13	1	1	2	1	3			1		1	1		1			2	14	5.83
Total	86	24	31	22	10	13	8	6	3	1	7	1	5		1	3	221	2.32

Private tutoring (out of school) Home Blank: II, 11. After the question were blank spaces for recording information on tutoring in music, drawing, painting, dancing, language, and "other subjects." The information called for included age at which the instruction was taken, hours a week

(including practice), and a rating of the ability shown as very superior, superior, average, inferior, or very inferior.

Of the 597 in the main group for whom Home Blanks were received, private tutoring was reported for 338, or 56 per cent. For the girls the proportion was 72 per cent; for the boys, 44.4 per cent. Those who had private tutoring devoted to it an average of 6.5 hours a week, including practice. Failure to reply to this question was taken to indicate that no private tutoring had been received, as this interpretation seemed valid in most cases. The above figures, however, may be somewhat too low. Even so, it would take a considerable stretch of the imagination to ascribe the superior intellectual development of these children to the results of private tutoring. Following is a detailed summary of the reports.

TABLE 102.

AMOUNT AND RESULTS OF PRIVATE TUTORING

	Per cent taking	Median hours weekly	Ability shown: Very sup.	Sup.	Av.	Infer.	Very infer.	Not stated
Music								
Boys	34%	5.4	11%	34%	47%	2%	0	6%
Girls	59%	5.9	13%	38%	40%	2.5%	1%	6%
Drawing and painting								
Boys	3%	5	20%	60%	40%	0	0	0
Girls	3%	2	0	63%	25%	0	0	12%
Dancing								
Boys	10.6%	1.6	9%	14%	51%	12%	0	14%
Girls	32.7%	1.8	15%	22%	52%	2%	1%	8%
Language								
Boys	7.3%	3	12%	25%	42%	0	0	21%
Girls	10.4%	2.7	14%	32%	39%	0	0	14%
"Other subjects"								
Boys	6.4%	3						
Girls	8.9%	2.7						

In the following spaces, put down a rough guess at the average number of hours a week of instruction child has received from members of the household at the ages indicated. Home Blank: II, 10. After the question were spaces for such records for ages 2-3, 4-5, 6-7. Kinds of instruction mentioned after the question were "telling stories or read-

ing to child," "teaching to read and write," "number work," and "nature study."

This question has been answered so incompletely as to make statistics misleading. Parents in many instances report that it is impossible for them to make even an approximate estimate, as the time spent in this way was so incidental and varied so much from day to day. In a large percentage of cases the question has been left unanswered. If the mean time were worked out for those answering the question, omitting those cases for whom it was not answered, the figures would be too high; if the cases for whom the question was not answered were counted as zero, the mean would be too low.

In the 595 blanks which have been returned, the largest number of replies to the first part of the question (telling stories or reading to child) at any of the three age periods for which the report is asked, is 380. To the second part (teaching child to read or write), the largest number of replies is 151. To the third part (number work with child), the largest number of replies is 146. To the fourth part (nature study work with child), the largest number of replies is 98. These figures seem to indicate that in the majority of cases failure to reply should be interpreted as indicating that no time was spent in this way, since the above order corresponds roughly at least to what one would expect in the way of negative responses. It is probable, however, that such is not always the case and that to interpret the entire group of failures to reply in this way would be to introduce a considerable element of error.

Has child shown very superior ability with respect to: (a) General intelligence? . . . . Age when first noted? . . . How shown? . . . . (Similarly for music, arithmetic or mathematics, science or nature study, mechanical ingenuity, drawing or painting, dramatics, dexterity in hand work.) Home Blank: II, 19. Table 103 gives the results for the 614 children for whom Home Blanks were received (334 boys and 280 girls). The "yes" and "no" columns giving per cents of total are perhaps the most significant. Among the outstanding facts are the following:

1. Girls more often than boys have shown superior ability in dramatics, music, and dexterity in hand work.

2. Boys more often than girls have shown superior ability in mechanical ingenuity and (to a slight extent) in arithmetic or mathematics.

3. Apart from general intelligence, superior ability is most often shown in arithmetic or mathematics in the case of both boys and girls.

4. In 8 per cent of cases, both boys and girls, the parents definitely state that they had not observed any indications of superiority in general intelligence. This rather surprising fact is probably accounted for by the high standard of intelligence which prevails in the home.

TABLE 103.

PROPORTION OF GIFTED REPORTED BY PARENTS AS SHOWING VARIOUS KINDS OF SUPERIOR ABILITY

Superior Ability	Not Stated		"No" % of Total		"Yes" % of Total		"Yes" % of answered	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
General Intel.	8%	7%	8%	8%	84%	85%	92%	91%
Music	24%	27%	45%	31%	31%	42%	41%	57%
Arith. or Math.	22%	27%	27%	28%	52%	45%	66%	62%
Sci. or Nat. Std.	43%	43%	28%	28%	29%	29%	51%	51%
Dramatics	41%	41%	41%	17%	18%	42%	31%	71%
Drawing & Paint.	38%	45%	35%	24%	27%	31%	43%	57%
Dexterity, Hand Work	46%	42%	33%	26%	21%	31%	39%	54%
Mech. Ingenuity	35%	50%	34%	43%	31%	7%	48%	15%

The reports regarding age at which superior abilities were first shown are summarized in Table 104.

1. The sex differences are here relatively small, but the lines in which superior ability is noted somewhat earlier with the boys than with the girls include music, arithmetic or mathematics, drawing or painting, and dexterity in hand work. The girls tend to show superior ability earlier in general intelligence, science or nature study, and mechanical ingenuity.

2. Considering both sexes, the order shown by the various abilities for precocity is, first, general intelligence (mean about 3.5 years); second, music (mean about 4.9 years); third, all the other abilities (means from about 5.75 to about 6.25 years).

Table 104.

Age When Various Superior Abilities Were First Noted

		N	0–1	1	2	3	4	5	6	7	8	9	10	11	12	13	Mean	S. D.
General Intelligence	B	244	23	35	48	52	19	24	18	7	9	5	4				3.7	2.48
	G	217	44	31	50	53	20	12	12	7	7	1					3.25	2.08
Music	B	91	9	6	9	15	16	11	8	7	5	3	1	1			4.6	2.56
	G	108	12	6	18	10	10	9	10	7	9	7	8	2			5.16	3.21
Arithmetic or Mathematics	B	137		1	7	11	30	25	29	16	11	3	2	1	1		5.88	2.02
	G	105			5	11	9	14	23	19	15	7	2				6.43	1.96
Science or Nature Study	B	73	1	1	7	5	7	14	12	9	9	1	6	1			6.18	2.52
	G	54	2	4	3	8	6	7	7	8	4	3	1	1			5.33	2.59
Mechanical Ingenuity	B	82		1	8	10	11	15	12	7	8	2	2	6			6.05	2.57
	G	17		2	1	1	1	4	2	3	2	1					5.74	2.35
Drawing or Painting	B	73			10	9	8	23	10	5	4	2	1	1			5.43	2.27
	G	69			9	9	7	19	8	9	7	3	2	1			6.05	2.13
Dramatics	B	49	1		6	8	7	7	5	7	4	2		1	1		5.62	2.49
	G	96		3	13	10	11	16	15	11	7	2	6		1	1	5.80	2.64
Dexterity, Hand Work	B	54			3	4	9	12	9	4	9	3		1			6.17	2.04
	G	68		2	2	5	7	13	8	11	10	5	3	1	1		6.63	2.35

Note: Age 1 = 1 to 2; 2 = 2 to 3, etc.

3. The sex differences in variability with respect to the age at which the various abilities are noted are too small to be very significant and are not uniform in direction.

The descriptions which the parents give of the early indications of superiority are usually couched in such general terms as to be less enlightening than one could wish. However, the tabulations are given for what they may be worth. The "miscellaneous" group includes all the indications which were not mentioned for as many as 5 per cent of the children in either sex for whom the special ability had been noted.

TABLE 105.

EARLY INDICATIONS OF SUPERIOR ABILITY

General Intelligence	Boys (282)	Girls (237)
Grasps and understands new ideas quickly	50	40
Desire for knowledge	31	31
Retentive memory	21	21
Intelligent conversation	20	15
Rapid progress at school	16	16
Keen general interests	22	9
Range of general information	15	12
Reasoning ability	13	13
Early speech	11	14
Asking intelligent questions	14	11
Ability in accomplishing difficult things	14	11
Keen observation	13	10
Unusual vocabulary	8	12
Originality	3	12
Miscellaneous	4	6
Positive report without explanation	27	14
Music	Boys (104)	Girls (117)
Good ear for music	19	20
Rapid progress in lessons	11	15
Sang well at early age	14	11
Carries tune well	8	9
Persistent desire to learn music	8	9
Sense of rhythm	8	8
Great interest in music	10	5
Unusual musical appreciation	4	10
Learns music easily	6	5
Has natural talent	7	4
Good work in original composition	4	6
Miscellaneous	0	6
Positive report without explanation	5	9

Arithmetic or Mathematics	Boys (172)	Girls (126)
Rapid progress at school	32	29
Desire to learn advanced work	19	15
Grasps numerical ideas quickly	19	8
Learned to count and make number combinations at early age	19	7
Is very quick with figures	7	14
Does difficult work with no effort	9	11
Unusual reasoning ability	8	12
Could make change at early age	8	3
Miscellaneous	25	14
Positive report without explanation	26	13

Science or Nature Study	Boys (98)	Girls (82)
Great lover of nature	26	26
Enjoys nature stories	12	3
Studies plant life	4	9
Collections of natural history specimens	7	6
Great interest in flowers and trees	6	7
Great interest in animals	6	4
Many questions on scientific subjects	5	4
Bird study	2	4
Miscellaneous	22	9
Positive report without explanation	8	10

Mechanical Ingenuity	Boys (105)	Girls (21)
Building with meccanno sets	16	3
Mechanical construction	14	2
Repairing things	6	3
Designing toys	7	1
Building boats, coasters, etc.	7	0
Knows the makes of all cars	7	0
Likes to work with tools	6	0
Progress in manual training	4	1
Mechanical drawing	5	0
Reads about mechanics	4	0
Studies ways of improving devices	4	0
Interested in wireless	1	2
Interested in anything mechanical	3	0
By persistent questions about mechanics	0	2
Miscellaneous	9	3
Positive report without explanation	12	4

Drawing or Painting	Boys (89)	Girls (87)
Marked interest in drawing or painting	29	33
Rapid progress in drawing or painting	10	5
Good at cartooning	10	4

Drawing or Painting	Boys (89)	Girls (87)
Likes to copy pictures	4	5
Illustrating	3	6
Good original work	4	4
Likes to sketch	2	6
Natural talent	1	5
Interested in designing	1	4
Interested in mechanical drawing	5	0
Miscellaneous	15	8
Positive report without explanation	5	7

Dramatics	Boys (61)	Girls (118)
In school and Sunday School plays	13	21
By impersonating characters	10	11
By expressive reading	1	15
By making up theatricals	5	10
By reciting and telling stories	8	3
In public speaking	5	6
Marked interest in dramatics	2	8
By writing plays	1	8
Successful stage or screen acting	2	6
Interpretive dancing	0	7
Miscellaneous	6	15
Positive report without explanation	8	8

Dexterity in Hand Work	Boys (70)	Girls (87)
Needlework or sewing	1	29
All kinds of hand work	2	14
Making dolls' clothes	0	14
Manual training progress	9	0
In school work	3	5
Crocheting or knitting	1	7
Marked interest in hand work	3	3
Clay modeling	3	3
Cutting	4	2
Use of tools	6	0
Making useful things	6	0
Very neat and accurate	2	3
Making toys	5	0
Wood carving and modeling	4	0
Miscellaneous	8	4
Positive report without explanation	13	3

What theories or ideas of child training have guided your educational efforts with the child? Please answer fully; for example, indicate what principles or rules have guided you in regard to each of the following: (A) answer-

ing child's questions; (B) stimulating desire to learn; (C) other matters you have considered important. Home Blank: II, 16.

This question is of interest only as showing general trends of thought. Replies have been rather loosely categorized and the categories arranged in order of frequency of occurrence. No further statistical treatment seemed worth while, as the chief value of the question lies in its import for the individual child rather than for the group as a whole.

No age or sex divisions seemed advisable. Several replies have often been given to the same part of the question (especially Part C); therefore the total number of replies does not coincide with the number of children for whom the question was answered. Many parents failed to answer the question at all, many others answered Part A only. A few answers in cases where the meaning was not clear were thrown out.

TABLE 106.

METHODS USED IN HOME TRAINING

A. *Answering child's questions:*

1. General replies such as "answer fully," "completely," "truthfully," "to the best of my ability," etc. 354
   "Patiently" is a word which frequently occurs here, an eloquent expression of the frequency with which the questions occur. "To the verge of exhaustion," one parent reports. In seven cases, however, the parent adds that the child asks "very few questions." This is usually followed by the comment, "He prefers to find out things for himself, does not like to be told them."
2. Answer if possible, otherwise look up matter with or for child or direct him to source of information. 61
   As might be expected, this answer occurs far more frequently with the older children than with the younger.
3. Try to suit answers to the level of his intelligence . . . 55
4. Answer questions which seem worth while. Discourage unnecessary questioning 15
5. Answer in such a way as to encourage further study and investigation 14
6. Answer completely unless matter is one concerning which child can and should find out for himself 13
7. Do not answer questions on sex matters 5
8. Through concrete experience wherever possible. Let him see the process 5
9. Answer if convenient, otherwise not 4
10. Always try to compare with facts already known . . . 4

B. *Stimulating desire to learn:*

1. Stimulating not necessary 97
   One parent adds, "On the contrary the child himself is, for the entire family, the greatest possible 'stimulation to learn' lest we should be shamed by contrast."
2. By supplying good books and magazines 85
3. General encouragement, by being interested in his interests, by praising good work, etc. 65
4. Through directed observation 40
5. By providing materials for educational play, such as kindergarten supplies, mechanical toys, wireless apparatus, etc. 21
6. "Have not stimulated," no reason given 20
7. By encouraging emulation 14
8. By endeavoring to form high ideals 10
9. Have avoided stimulation, afraid of overstrain 9
10. Direct instruction by some member of the household in reading, writing, etc. 8
11. Through rewards for school accomplishment 7
12. Encourage work along line of special ability 6
13. By example of parent 4
14. By awakening curiosity 4

C. *Other matters you have deemed important:*

1. Truthfulness and honesty 66
2. Companionship between parent and child 43
3. Religious training 41
4. Obedience 35
5. Formation of good social and moral habits 35
6. Careful attention to health 31
7. Good reading matter 21
   (Note also that 85 parents have mentioned reading under Part B.)
8. Spirit of coöperativeness, fair play, etc. 19
9. Self-reliance 15
10. Contact with aesthetic stimuli 13
11. Instruction in sex matters 13
12. Coöperation between home and school 11
13. Logical motivation of conduct 11
14. Correct habits of speech 10
15. Careful choice of associates and playmates 10
16. Outdoor play 9
17. Travel 7
18. To develop spirit of trustworthiness and honor . . . 7
19. Punctuality 6
20. Habits of thoroughness 6
21. Concentration 6
22. Fair-mindedness. Freedom from bias or dogma . . . 5
23. Wide general information 5

24. Courage 5
25. Avoidance of fatigue 5
26. Educational movies, lectures, etc. 4
27. Practical training in household affairs 4
28. Cheerfulness 3
29. Develop individuality 3
30. To see that first impressions are correct 3
31. Encourage self-expression 2
32. To keep child modest and free from conceit 2
33. Encourage original research 2
34. Pre-natal influence 1
35. To teach dangers of alcohol and tobacco 1

Summary and Conclusions

1. The average gifted child enters school (above the kindergarten) at 6¼ years. Three-fifths have previously attended a kindergarten, the average length of such attendance being a little more than half a school year. Low first grade is skipped by 21 per cent of the children, and the entire first grade by 10 per cent.

2. According to the usual standards, about 85 per cent of the gifted children are accelerated and not one is retarded. The average progress quotient is 114, which means that the average gifted child is accelerated 14 per cent of his age. The average P.Q. is somewhat higher than this for the younger children and somewhat lower for the older. Approximately 85 per cent have skipped one or more half grades, as compared with 4 per cent who have repeated. The mean net gain from skipping is one full grade. According to the testimony of the teachers the average gifted child merits additional promotion to the extent of 1.3 half grades, or about two-thirds of a grade. In all, 82 per cent are said to merit some additional promotion.

3. The discrepancy between mean age and mean mental age of gifted children in the first grade is 2.8 years, and by grade 5 this is increased to nearly 5 years.

4. Teachers' ratings of school work show that the gifted children, as a rule, are doing work of superior quality in the grade where they are located. The superiority is greatest in "thought" subjects and is near zero in such subjects as penmanship, sewing, manual training, games and sports.

5. Two and a half times as many gifted as control children are rated as "very even" in mental ability, but twice as

many of the gifted group are rated as "very uneven." The girls are rated as uneven somewhat less often than the boys.

6. Our gifted children have on the average attended two different schools by the age of 8 years, and three by the age of 11.

7. The mean estimated number of days of absence from school during a year is 12.

8. Only 1 per cent of the gifted are reported by parents as having a positive dislike for school. With 4 per cent more the liking is "slight." It is "very strong" with 54 per cent of boys and 70 per cent of girls.

9. According to the school reports, less than half as many gifted as control children display an undesirable attitude toward school.

10. Nearly half of the gifted children learned to read before starting to school. At least 20 per cent (and probably considerably more) learned to read before the age of 5 years, at least 6 per cent before 4, and at least 1.6 per cent before 3. Most of these learned to read with little or no formal instruction.

11. Roughly, 70 per cent of the parents say they have allowed the child to go his own pace in school, 20 per cent have encouraged rapid progress, and 10 per cent have held the child back.

12. The average gifted child does about two hours of home work per week on school lessons. Somewhat more than half the group have private lessons in such special subjects as music, drawing, painting, dancing, language, etc. Those who take such lessons devote an average of six and a half hours a week to them, including practice.

13. Parents reported indications of superior ability in arithmetic in the case of almost half of the group. The proportion was about a third for music, and somewhat less for dramatics and drawing or painting. The parents of 8 per cent report that they had never observed in their children any indications of superior general intelligence. For the others, the average age at which intellectual superiority was first noted was about three and a half years (3.7 for boys and 3.25 for girls). Musical ability first appeared at an average age of 5 and the other special abilities at an average age of 6.

14. The indications of superior intelligence most often noted were quick understanding, insatiable curiosity, extensive information, retentive memory, early speech, unusual vocabulary, etc.

15. Very few of the parents have carried out any systematic scheme of child training, but a majority have encouraged the child by answering his questions and taking an interest in the things which concerned him.

16. Although the home environment of the gifted children has been, on the whole, above the average, nothing has been found to warrant the belief that the superior intellectual attainments of our gifted group are in any considerable degree the product of artificial stimulation or forced culture.

CHAPTER XI

TESTS OF SCHOOL ACCOMPLISHMENT AND OF GENERAL INFORMATION[1]

School progress, estimates of the quality of school work, and data on educational history have been treated in the preceding chapter. The present chapter gives the results of the more exact measurement of educational accomplishment secured by the use of the Stanford Achievement Tests and of a test of general information in (1) elementary science, hygiene, and geography; (2) language and literature; (3) history and civics; and (4) the arts.

Stanford Achievement Tests

Immediately after the search for subjects was completed (May and June, 1922) the children of the main experimental group were brought together in groups of 10 to 40 and given the Stanford Achievement Tests. The number tested at each age was as follows, reckoning age as of date the tests were given:

	Boys	Girls	Total
6 and 7	27	27	54
8	39	33	72
9	47	45	92
10	70	45	115
11	68	52	120
12	40	40	80
13 and 14	16	16	32
Total	307	258	565

Instead of the two information tests of the Stanford Achievement battery, a more extended information test of the same general type was given. The other achievement tests were those of the Stanford Achievement battery unmodified. The derivation of these tests, and the procedure in giving them, are described in the *Manual of Directions*.[2]

[1]Written with the assistance of A. S. Raubenheimer and Florence L. Goodenough.

[2]World Book Company, 1923.

The occasion for undertaking the preparation of Stanford Achievement Tests was the need for a more reliable measure of the educational abilities of the gifted children than could be secured by any of the tests already available. It seemed a matter of considerable importance to determine with a small probable error the educational accomplishments not only of the group as a whole, but of each individual child. Before intelligent provision can be made for the education of gifted children it is necessary to know what their accomplishments are under the present system: whether they are achieving to the limit of their abilities; whether they are being unduly retarded; whether their accomplishment is better in some subjects than in others; whether they show an excessive tendency to unevenness, etc. That the Stanford Achievement Tests are capable of answering these questions with a rather high degree of accuracy, is evident from the reliability coefficients of the separate tests composing the battery. These have been computed for the separate age groups of 7 to 15 years. The average age reliabilities are as follows:

Paragraph Meaning	.91
Sentence Meaning	.89
Word Meaning	.95
Computation	.87
Arithmetical Reasoning	.88
Language Usage	.80
Spelling	.91
Educational Age	.98

The average P.E. of an educational age based upon the Stanford battery (1.77 months) is so low that the score earned by an individual child may be accepted with considerable confidence.

The total working time for the separate tests is as follows:

	Grades 2 and 3	Grades 4 to 8
Word Meaning	5 min.	10 min.
Sentence Meaning	5 "	10 "
Paragraph Meaning	15 "	20 "
Computation	10 "	20 "
Reasoning	10 "	20 "
Language Usage	(Not given in these grades)	8 "
Spelling	18 " (approx.)	15 " (approx.)
Total	63 " (approx.)	103 " (approx.)

The time allotments are liberal enough to make each test almost entirely a test of "power" rather than of speed. The tests measure the child's actual mastery of the various school subjects, not his mental agility or his previous acquaintance with pencil-and-paper tests.

The control group in this case consisted of approximately 1,800 unselected children who were tested in the derivation of the norms published in the 1923 edition of the *Manual of Directions*. These were enrolled in the public schools of San Jose and several other representative small cities of California. The norms yielded by this group differed little from the revised norms of 1924 based upon the analysis of 10,000 tests from representative cities of the United States.

Mean scores and mean "subject quotients" have been computed for each age and sex group (tables 107, 108, and 109). The subject quotients are in each case the quotient of the child's age score divided by his chronological age. The age norms are those given in the 1923 *Manual of Directions*.

In Figure 10a are shown the subject quotient profiles of the gifted boys and girls who took the achievement and information tests. These are based on the mean quotients for the ages combined. For purposes of comparison the mean IQ's of the same children who took the achievement and information tests are also shown in Figure 10a.

Figure 10a and tables 107, 108, and 109 show a remarkable superiority of the gifted group over the unselected school children in educational achievement. The mean subject quotients for the different ages fall chiefly between 130 and 150. Table 109 gives the distributions and mean subject quotients for the ages combined, together with the distribution and mean of the corrected IQ's of the same children who took the achievement tests. The means are as follows, in order of magnitude:

	Boys	Girls
Mean IQ	151.6	151.6
" Lang. Q.	146.2	148.3
" Read. Q.	145.3	144.7
" Arith. Q.	138.5	135.7
" Spelling Q.	140.2	137.7

Roughly, the subject quotients are about four-fifths as superior as the IQ's. They would doubtless be higher but for the fact that promotions earned have been denied. That

Table 107.

Means and Standard Deviations of Achievement Test Scores by Age

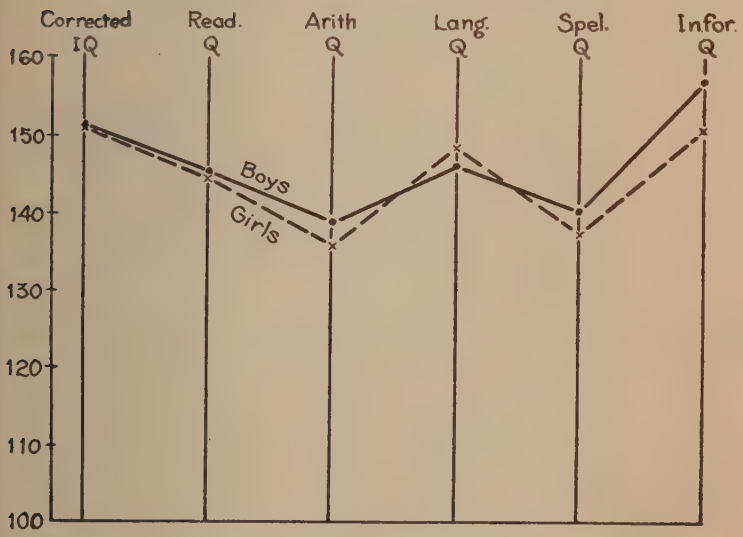
Mean and S.D's		Word Meaning		Sentence Meaning		Paragraph Meaning		Reading Total		Arith. Comput.		Arith. Reas.		Arith. Total		Language Usage		Spelling	
		Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Age 6 and 7	M.	21.1	20.1	18.8	19.6	35.3	40.2	75.2	79.9	43.6	49.4	31.3	31.8	74.9	81.2	20.3	21.9	56.4	66.4
	S.D.	13.5	12.0	12.4	10.9	23.6	19.8	46.3	40.5	20.1	18.2	17.5	15.3	39.4	32.0	9.1	13.1	30.0	18.8
Age 8	M.	44.8	41.2	39.9	39.2	71.3	66.3	156.0	146.7	85.3	85.1	61.2	59.4	146.5	144.5	32.0	33.4	108.8	100.7
	S.D.	11.0	13.3	9.8	14.6	10.7	17.5	26.6	43.9	15.9	27.4	16.1	18.3	23.3	42.1	8.9	7.7	24.7	29.0
Age 9	M.	56.3	52.5	52.3	49.3	80.2	82.7	189.8	184.4	106.1	100.1	73.4	71.3	184.5	171.4	38.4	34.2	138.0	121.6
	S.D.	11.9	9.6	13.0	10.7	12.5	12.3	27.5	27.1	23.2	21.6	20.8	14.9	39.8	29.0	7.8	7.0	30.3	22.6
Age 10	M.	64.1	62.7	59.9	60.9	87.6	89.8	211.6	213.4	123.1	122.1	93.4	83.8	216.5	205.9	39.8	41.8	146.4	145.4
	S.D.	8.7	7.6	12.8	9.7	10.2	10.2	24.6	22.5	22.6	13.4	20.1	13.4	37.0	23.1	9.3	8.4	23.5	23.1
Age 11	M.	70.3	71.2	69.7	69.1	97.3	95.8	237.3	236.1	134.7	133.7	109.8	102.8	244.5	236.5	44.2	47.9	168.2	170.1
	S.D.	7.7	7.1	8.6	7.6	10.2	11.0	20.7	20.2	17.8	14.0	19.2	16.2	32.3	26.7	8.6	5.2	24.3	22.0
Age 12	M.	76.9	75.6	72.8	73.6	99.6	101.8	249.3	251.0	143.0	142.5	121.3	111.7	264.3	254.2	46.2	48.0	186.5	185.5
	S.D.	6.9	6.6	5.8	5.7	11.5	8.4	16.1	17.4	13.9	17.0	16.3	15.2	23.4	28.5	6.6	6.0	13.3	23.1
Age 13 and 14	M.	77.8	80.4	77.4	75.4	100.9	104.5	256.1	260.3	152.4	145.1	127.4	119.5	279.8	264.6	51.6	54.3	192.2	193.3
	S.D.	6.2	4.2	4.5	4.2	8.1	6.6	11.9	11.7	15.7	17.8	11.6	17.0	23.5	29.5	6.5	3.4	17.3	28.0

Note: Number at each age approximately as given on p. 289, except that Language Usage, which was not given below Grade 4, was taken by only eight boys and six girls of the ages 6 and 7.

the subject matter should have been mastered to a point more than 40 per cent above chronological age, while the children have been held on the average to a grade location only 14 per cent above the norm for their chronological ages, is a noteworthy achievement.

FIGURE 10a.

SUBJECT QUOTIENT PROFILE OF GIFTED CHILDREN
(Based on mean quotients for the ages combined)



There are only small sex differences in the subject matter achievement of these gifted children, although the boys of 9 years and above are somewhat superior to the girls in arithmetic, while the girls of 10 and above are slightly superior to boys in language usage. In both sexes the mean subject quotients all increase for a year or two after age 7 and show a marked decline at 12 and 13. The relatively low quotients at 6 and 7 may be due to the fact that the children of this age have attended school for only a brief period. The decline at 12 and 13 may be due to two causes: (1) the fact that the brightest children of these ages were missed because of promotion to high school; and (2) the inadequacy of the (projected) age norms above 14 years.

In general, the subject quotients of a given child tended to run fairly even. Occasionally, however, specialization of considerable magnitude was found, and in a good many cases the degree of specialization appeared large enough to be probably significant. The data bearing on this question have been analyzed elsewhere by more accurate methods than the use of subject quotients made possible. (See Chapter XII.)

TABLE 108.

MEANS AND STANDARD DEVIATIONS OF SUBJECT QUOTIENTS BY AGE

Means and S.D's		Reading Total		Arithmetic Total		Language Usage		Spelling	
		Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Age 6 and	7, M.	139	142	130	133	143	156	136	141
	S. D.	15.95	15.25	14.47	10.50	16.55	24.70	13.05	9.35
Age 8,	M	151	148	138	140	160	163	145	144
	S. D.	13.21	17.65	11.36	14.85	20.44	18.35	12.85	12.25
Age 9,	M	151	151	141	137	159	153	147	138
	S. D.	12.63	12.15	17.36	12.35	13.73	14.45	18.85	7.45
Age 10,	M	148	148	142	138	147	151	137	137
	S. D.	11.23	8.80	14.52	8.55	14.42	12.55	12.38	12.62
Age 11,	M	145	145	139	137	141	147	139	140
	S. D.	8.02	9.05	11.43	10.10	11.17	9.15	13.97	12.91
Age 12,	M	138	137	136	131	133	135	139	137
	S. D.	6.69	6.05	8.06	10.40	9.38	8.30	8.6	11.37
Age 13 and 14,	M.	131	131	131	124	128	132	134	132
	S. D.	4.17	4.95	6.75	10.85	6.75	6.20	9.95	14.45

It must not be supposed, however, that all of our gifted children are satisfactory pupils. The large majority of them are, according to the statements of their teachers, but there are occasional exceptions. A few are rated low in quality of school work because of flagrant neglect of their daily tasks. There is reason to believe that others suffer in their class marks because of traits of personality which irritate the teacher or lead to an unjust appraisal of subject matter accomplishment. Gifted children, like others, differ greatly in temperament, ambition, personal attractiveness, and ability to display their knowledge to advantage. Some lack interest because the work is too easy for them.

TABLE 109.

DISTRIBUTION OF SUBJECT QUOTIENTS, AGES 6 TO 13 COMBINED

	Reading Total		Arithmetic Total		Language Usage		Spelling		Corrected IQ	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
200										1
195					1	1	1			0
190					0	3	1			2
185			1		2	1	1		1	1
180	1		1		5	5	1		7	2
175	2	3	1	1	7	7	1		2	5
170	7	8	3	0	9	7	2	1	11	9
165	9	8	4	1	20	10	4	3	17	9
160	19	13	10	6	17	19	8	7	23	17
155	26	19	20	9	24	20	20	15	26	33
150	55	35	17	13	29	27	28	18	75	45
145	38	39	38	22	41	34	39	28	68	67
140	56	38	43	39	33	30	51	39	78	64
135	34	47	49	48	23	25	42	36	9	8
130	34	26	51	40	31	20	31	28		1
125	17	12	28	40	17	14	27	37		
120	5	6	19	19	6	10	16	20		
115	2	4	15	10	8	1	13	9		
110	1		7	5	6	1	6	5		
105	1	1	2	4			2	1		
100			1	1	2		1			
95					1					
90										
85					1					
80–84								1		
Total	307	259	310	258	283	235	295	248	317	264
Mean	145.30	144.73	138.52	135.70	146.23	148.32	140.17	137.65	151.60	151.56
S. D.	12.18	12.51	13.60	11.90	17.22	15.88	14.19	12.98	9.95	10.70

General Information Tests

The general information test[1] used is in part identical with the information tests of the Stanford Achievement battery, but is more reliable and covers a wider range. Two comparable forms were developed, each containing 335 items, distributed as follows:

Geography, hygiene, and elementary science	110 items
Language and literature	90 "
History and civics	90 "
The arts	45 "
Total	335 "

The 770 items included in the two forms were selected from approximately 2,500 which were prepared. The 2,500 items were based upon an analysis of (1) textbooks used in grades 3 to 12; (2) courses of study; (3) published studies on curriculum content in elementary and high schools; and (4) other information tests. Considerable non-scholastic material was also included. The intention was to secure a reliable measure of general information which would be applicable to children of grades 3 to 12. First, the number of items was reduced to 1,647 by the combined rating of five judges. The 1,647 retained were then broken up into three comparable forms, printed, and given to children in grades 3 to 9 in San Jose, Redwood City, and San Mateo, California. Each item of the 1,647 was validated by computing the per cent of successful responses in each grade. Individual curves were plotted and all items not showing a significant and consistent increase in the per cent of correct responses from grade to grade were eliminated. These curves were based upon fifty pupils of approximately average ability selected as follows from the entire number tested: (1) Each teacher ranked all the pupils of her class in order of general scholastic ability; the median pupil, plus the eight pupils just above the median and the seven just below were taken as representing that grade in that city. (2) Three such groups, one from each of the cities in which the preliminary tests were given, were combined to represent the grade in

[1]Valuable assistance was given by Dr. G. M. Ruch in the collection of material for this test.

question. Three cities were used in order to guard against the influence of local experience and local instruction. Using the per cent data as a basis for the evaluation of the 1,647 items, two final forms were made up, each having 335 items. Each item is a statement containing three response words or phrases, the correct one to be designated by underlining. In assembling the two forms, care was taken to make them analogous in content and equally difficult at all points. The individual items were arranged in order of difficulty. Illustrations of items retained in Form B are as follows:

1. Geography, hygiene and elementary science.

2. The earth is shaped most like a BASEBALL FOOTBALL PEAR.
22. The anvil is used by BLACKSMITHS CARPENTERS PAINTERS.
41. The house-fly spreads BUBONIC PLAGUE TYPHOID YELLOW-FEVER.
60. The ligaments are attached to the BONES INTESTINES STOMACH.
80. Cumulus refers to CLOUDS ELECTRICITY EROSION.
100. The cube of 2 is 4 6 8.
110. Water enters the roots of plants by CAPILLARY OSMOSIS SOLUTION.

2. Language and literature.

2. The shepherd boy who became king was DAVID SAUL SOLOMON.
22. An example of a noun is BIRD FOR SEE.
44. Barbara Frietchie sympathized with the ENGLISH SOUTH UNION.
61. "Styx" was the name of a GIANT GOD RIVER.
82. E. G. means FOR EXAMPLE SEE BELOW THAT IS.

3. History and civics.

3. The United States has a KING PRESIDENT EMPEROR.
23. Roger Williams was COLONIZER JUDGE MERCHANT.
42. The power of declaring war is vested in CONGRESS PRESIDENT SECRETARY OF WAR.
60. The "Invincible Armada" belonged to FRANCE ROME SPAIN.
82. The Southern States seceded in 1850 1861 1865.
90. The law of gravitation was first stated by COPERNICUS GALILEO NEWTON.

4. The arts.

4. Crayons are used in MODELING DRAWING MUSIC.
8. A duet is sung by TWO FOUR SIX.
22. R. S. V. P. means COLLECT ON DELIVERY INFORMAL REPLY EXPECTED.
39. Handel is known as a MUSICAL COMPOSER ORGANIST VIOLINIST.
44. Rodin is famous as an ARCHITECT A PAINTER A SCULPTOR.

The items in each part of the test cover an extremely wide range. For example, in Form B, Test 1 calls for information concerning soap, ivory, planes, the burro, tadpoles, peat, cloths, the largest state in the Union, soda, 3.1416, dynamos, the tides, plant "breathing," insulating materials, pollination, etc.; Test 2, concerning Black Beauty, Cinderella's coach, Hiawatha, Huckleberry Finn's chum, adjectives, the plural of *was,* Sir Launfal, gnomes, Vulcan, the author of The Raven, the prefix *inter,* The Jungle Book, Milton, etc.; Test 3, concerning Columbus, colonial settlers,

Mohammed, the trial by jury, the Red Cross, the Pope, the allies of Germany, the feudal system, federal authority, the Soviet, Horace Mann, Pericles, etc.; Test 4, concerning movie stars, musical notation, mixing paints, jazz, Beethoven, social form, stucco, sculpture, architecture, operas, etc.

One form of the test requires approximately an hour for administration. It is given as a "power" test, enough time being allowed for all of the pupils to finish. Score is the number of right responses minus half the number of wrong responses.

Both forms of the test were given to 463 unselected pupils (216 boys and 247 girls) fairly evenly distributed in grades 3 to 9 in the cities of San Jose, Sunnyvale, and Mountain View (California) for purposes of standardization. These pupils served as the control group in the evaluation of the scores earned by the gifted children. Half of the control group took Form A first; the other half, Form B first.

Reliabilities were computed by age and grade by correlating the scores of Form A against those of Form B. These are given in Table 110.

TABLE 110.

RELIABILITY COEFFICIENTS OF THE INFORMATION TEST

Grades	r Form A vs. Form B	S.D. of Form A	S.D. of Form B
3	.60	14.3	13.2
4	.79	26.3	26.8
5	.84	34.0	29.6
6	.87	41.8	40.6
7	.95	47.7	49.1
8	.90	40.0	41.1
9	.88	43.0	39.9
Ages			
8	.85	17.6	17.3
9	.89	30.3	30.5
10	.94	35.6	37.5
11	.89	54.4	53.1
12	.96	69.9	61.2
13	.91	68.5	66.9
14	.94	65.8	62.4
15	.95	72.1	72.7

The average reliability for a single age group is .917. The reliability of two forms, computed by Brown's formula, is .96. Only one form was given to the gifted group.

Age norms were derived for the total score and for each of the four tests by smoothing the age means. In each case this gave approximately a straight line from age 8 to age 15. In order to make possible the calculation of information quotients for the brighter children, the line was extended beyond 15. The "age" norms above 15 are thus fictitious units, equal in size to the units in the lower range. This is not a refined statistical procedure, but it affords a convenient method of comparing high scores when minute exactness is not demanded.

Means and S.D's of the gifted and control group by age and sex are shown in Table 111.

Table 112 gives the distribution of information quotients of the gifted group by age and sex separately and for ages and sexes combined.

The superiority of the gifted group in general information is seen to be very great indeed. This holds for both sexes, at all ages, and for each of the four types of information tested. In most of the comparisons the gifted excel the control by from two to five times the S.D. of the latter; more commonly by three or four times. The mean information quotient is about as high as the mean intelligence quotient, and is somewhat higher for gifted boys than for gifted girls. This sex difference is not found with the control. At ages 8, 9, and 10, not a single child of the control group reached the mean score of the gifted of corresponding age. The mean of the gifted boys was reached by 3.6 per cent of the control boys at age 12, and by 2.2 per cent at age 13. The mean of the gifted girls was reached by 2.5 per cent of the control girls at age 11 and by 7.7 per cent at age 12. Only 2 of 291 gifted boys, and 5 of 242 gifted girls, earned an information quotient below 120. Not a single gifted child fell as low as the average of the control. The difference between the two groups is somewhat less in history and civics than in the other types of information tested.

Table 113 shows that the mean quotients of the gifted children tend to run highest for language and literature, and lowest for history and civics. Only in the arts score do girls equal the boys. In science and history the boys excel the girls by a considerable margin.

Table 111.

Means and S.D's of Information Scores, Gifted and Control Groups

Means by Age	Science, etc.		Lang. and Lit.		Hist. and Civics		The Arts		Total Score	
	Gifted	Control	Gifted	Control	Gifted	Control	Gifted	Control	Gifted	Control
6 and 7	22.8		21.9		11.1		9.0		64.8	
Boys	24.6		22.3		14.3		8.9		70.1	
Girls	21.1		21.6		8.0		9.1		59.8	
8	40.0	6.7	34.7	8.4	21.8	3.7	14.5	3.9	111.0	21.9
Boys	43.5	9.6	37.2	11.8	25.2	5.7	14.5	5.0	120.4	29.9
Girls	36.3	5.6	31.9	7.1	17.9	2.9	14.4	3.5	100.5	18.2
9	54.0	15.6	45.0	13.8	32.6	7.1	19.8	6.6	151.4	41.9
Boys	62.0	15.7	47.6	12.9	37.1	9.0	21.5	5.9	168.2	41.8
Girls	44.8	15.6	42.0	14.4	27.5	5.9	17.8	7.0	132.1	42.0
10	62.6	21.7	43.4	15.3	47.3	11.8	24.3	6.9	187.6	53.7
Boys	64.9	22.8	54.4	15.1	51.5	13.5	24.2	7.6	195.0	56.2
Girls	59.3	19.6	51.8	15.4	40.9	9.7	24.4	5.8	176.4	50.7
11	73.4	28.8	65.7	23.5	61.7	18.5	29.7	9.9	230.5	80.7
Boys	76.3	30.8	67.1	22.6	65.7	20.4	29.9	9.2	239.0	82.9
Girls	69.0	27.1	63.6	24.2	55.6	17.0	29.6	10.4	217.8	78.8
12	80.5	42.0	72.2	32.7	69.7	28.9	32.4	14.1	254.8	118.4
Boys	84.7	43.5	71.4	30.5	72.7	28.9	31.2	13.2	260.0	115.8
Girls	76.9	40.4	72.8	35.4	67.1	29.0	33.4	16.7	250.2	121.2
13	87.5	47.6	77.3	37.0	75.5	34.9	37.7	16.4	278.0	134.3
Boys	90.8	50.0	76.2	35.3	76.0	38.2	36.7	17.0	279.7	142.7
Girls	84.4	43.2	78.3	38.4	75.0	31.9	38.6	15.8	276.3	126.6

TABLE 111 (Continued).

MEANS AND S.D'S OF INFORMATION SCORES, GIFTED AND CONTROL GROUPS

S.D's by Age	Science, etc.		Lang. and Lit.		Hist. and Civics		The Arts		Total Score	
	Gifted	Control	Gifted	Control	Gifted	Control	Gifted	Control	Gifted	Control
6 and 7	11.86		9.95		11.87		3.69		30.78	
Boys	11.23		10.14		14.66		2.67		31.25	
Girls	12.19		9.71		7.23		4.44		29.50	
8	11.83	6.17	10.67	5.68	15.67	3.45	5.36	2.81	33.56	15.78
Boys	12.57	8.84	10.82	6.84	17.82	4.16	5.27	4.65	37.31	23.61
Girls	9.45	4.14	9.76	4.29	11.76	2.74	5.22	2.30	29.11	9.10
9	14.92	13.39	10.65	9.33	15.00	5.83	6.59	3.67	41.24	29.53
Boys	12.01	13.14	10.53	10.41	17.11	5.18	6.71	3.78	38.84	31.04
Girls	12.49	13.77	9.97	7.97	12.54	6.00	5.83	3.24	35.13	27.17
10	11.81	14.71	11.38	9.87	13.53	10.13	6.66	4.31	33.90	36.57
Boys	10.81	15.92	11.02	10.81	13.61	10.96	6.78	4.38	31.68	38.84
Girls	12.48	12.86	11.73	8.56	10.60	7.72	6.48	4.16	34.47	32.20
11	12.25	19.97	10.39	15.90	12.09	15.26	6.36	6.41	34.31	55.40
Boys	11.66	21.79	9.49	16.16	10.49	17.27	6.73	6.66	32.20	60.21
Girls	11.63	17.07	11.28	15.60	11.88	12.34	5.76	6.15	33.46	50.87
12	9.88	21.12	7.38	18.30	9.32	20.37	5.81	8.40	24.74	65.79
Boys	8.43	23.60	7.37	15.50	7.89	20.76	6.99	8.08	24.57	61.82
Girls	9.73	19.49	7.34	20.59	9.50	19.90	4.32	8.26	20.55	70.45
13	8.50	21.72	5.33	20.12	7.90	20.67	3.89	9.03	18.28	69.49
Boys	7.00	22.07	5.91	19.62	9.04	21.67	4.37	9.33	19.24	71.66
Girls	8.36	20.80	4.48	20.18	6.93	19.44	3.18	8.67	17.13	65.26

TABLE 112.

DISTRIBUTION OF INFORMATION QUOTIENTS OF GIFTED CHILDREN

	6 and 7		8		9		10		11		12		13 and 14		Total	
	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G
204																
200																
195																
190					2										2	
185			1		1		1								3	
180			2		1		3	1							6	1
175		1	2		4	1	5								11	2
170	1		2		4	1	5	2	7	4					19	7
165	2		2	2	6	1	8	1	17	4					35	8
160	1	2	2	1	4	7	7	3	11	7	6	1			31	21
155			5	1	5	2	8	5	8	6	10	9			36	23
150	1	3	2	6	3	4	9	8	13	7	11	8	2	3	41	39
145	3	1	4	5	7	3	9	7	2	5	6	12	8	4	39	37
140	2	1	3	4	4	5	5	5	4	10	3	6	6	7	27	38
135	2	2	3	3	2	5	1	3	3	4	4	3	2	5	17	25
130	3	2	5	6	1	3	5	4	3	2					17	17
125	1	2	1	1		2		3		1					2	9
120	1	3	1	1	1	4		1							3	9
115		1		1		1	1	1							1	4
110			1	1											1	1
Mean	145.4	140.6	151.6	142.6	159.7	145.7	157.5	147.7	158.2	152.3	152.2	149.7	145.3	143.8	157.4	151.0
S.D.	14.5	16.3	18.3	13.0	15.8	15.3	14.6	13.7	10.9	9.5	5.5	5.7	4.2	5.1		

TABLE 113.

MEAN QUOTIENTS OF GIFTED CHILDREN ON THE SEPARATE PARTS OF THE INFORMATION TEST

Age	6 and 7		8		9		10		11		12		13 and 14	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Science, etc.	146	137	152	143	159	142	154	145	151	145	146	142	141	137
Lang. & Lit.	152	147	157	152	163	153	158	152	159	156	154	153	143	145
Hist. & Civics	137	129	140	131	148	134	158	140	158	140	153	147	143	143
The Arts	145	143	151	154	159	151	157	157	157	158	146	153	144	144
Total Score	145	140	151	142	159	145	157	147	158	152	152	150	145	144

The following coefficients of variation $\left(V = \frac{S.D. \times 100}{M}\right)$ in general information were found for the gifted and control groups of 8 to 13 years:

	8 years		9 years		10 years		11 years		12 years		13 years	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Gifted	31	29	23	27	16	20	13	15	9.5	8.2	6.9	6.2
Control	79	50	74	65	69	64	73	65	53	58	50	52

That the gifted make a showing in general information even better than they make in such subjects as reading, arithmetic, and spelling, is probably due to the fact that a child's stock of information is more dependent upon intellectual initiative and less upon formal school instruction. It would seem, therefore, that general information tests might be more valid than achievement tests for use in selecting pupils for special instruction in gifted classes. They probably compare well with the best group intelligence tests for this purpose, and they have the advantage of being easier to administer. In giving an information test of the kind we have used, it is only necessary to place a blank before the child and let him work through it. No supervision is necessary except to see that aid is not secured from books or from other pupils. If the child cannot be brought for a test to an examiner who is familiar with test procedure, a blank may be sent for use by any teacher or parent, with no risk that the score will be invalidated by incorrect procedure.

The Influence of Attendance upon Educational Accomplishment

The outstanding fact is that these children have accomplished so much in the various school subjects with such a brief period of instruction. For example, a gifted child of 8 who has attended school only two years has usually mastered the work of about five grades as well as it has been mastered by the average unselected child at the time he is considered ready for promotion to the sixth grade. A gifted child of 7 who has attended school one year has usually mastered the work of three or four grades. Actual length of school attendance seems to play little part in determining accomplishment in comparison with the part played by native endowment.

It is possible to secure a measure of the influence of length of school attendance upon educational accomplishment. Possible determinants of accomplishment are age, intelligence, and length of school attendance. The influence of any two of these may be eliminated by means of the partial correlation method or by treating the data of a group of subjects who have the same (or practically the same) chronological age. We have taken for treatment the

109 cases having a chronological age of 10 to 11 years at the time the achievement test was given. The IQ's of these children ranged from 139 to 190, with S.D. of 10.44. The length of school attendance ranged from 2 years to 6½ years, with S.D. of .858 of a year.

The following correlations were found:

School attendance	vs.	Spelling Q,	r = .041	±.066
" "	"	Information Q,	r = .003	±.067
" "	"	Reading Q,	r = −.099	±.066
" "	"	Arithmetic Q,	r = .132	±.065
" "	"	IQ,	r = .013	±.067
IQ	vs.	Spelling Q,	r = .328	±.060
"	"	Information Q,	r = .457	±.052
"	"	Reading Q,	r = .342	±.059
"	"	Arithmetic Q,	r = .261	±.062

It is evident that school attendance, although it has varied greatly, has had no appreciable effect on subject matter accomplishment. On the other hand, the IQ, although the range is relatively very small, has been an important factor in determining accomplishment.

Summary

The educational accomplishment of 543 children of the main experimental group was measured by the Stanford Achievement Tests in reading, arithmetic, language usage, and spelling, and by a general information test of 335 items. The results on all of these tests have been compared with the test scores of unselected school children of corresponding age. The most important findings are as follows:

1. The superiority of the gifted children of a given age over unselected children of corresponding age is very great, amounting in most cases to from three to four times the S.D. of the unselected age group. This superiority holds for all the fields of accomplishment tested, at all ages, and with both sexes.

2. The accomplishment quotient of the gifted in the various school subjects tends to run from three-fourths to four-fifths as far above the average as do the intelligence quotients. The information quotients, however, run about as high as the intelligence quotients. No child in the gifted group earned an information quotient as low as 110.

3. In general, the average gifted child has mastered the subject matter of instruction to a point 40 per cent above his chronological age, although he has been held back to a grade location only 14 per cent beyond the norm for his chronological age.

4. The superiority of the gifted is greatest in general information, language usage, and reading, and least in history and civics. The quotients of the gifted are higher in the age range 8 to 12 than for younger or older children.

5. Gifted boys excel gifted girls in general information, arithmetic, and spelling. The girls of 10 and above are slightly superior to boys in language usage. When the scores of the sexes on the separate parts of the information test are compared, the boys are found markedly superior to the girls in science and history and somewhat superior in language and literature. On information relating to the arts the girls do as well as the boys.

6. There were few cases of extreme unevenness among the various quotients of a given child, but degrees of specialization large enough to be of possible significance were fairly numerous.

7. The accomplishment quotients of a considerable number of gifted children are higher than the teachers' marks given on the basis of daily performance in the classroom would lead one to expect. Presumably, in such cases the teacher has either underestimated the child's accomplishment or has given low marks as a penalty for lack of application to the set tasks of the school.

8. At a given age there is practically no correlation between educational accomplishment and the number of terms the gifted child has attended school. The causes of school success and of school failure lie deeper.

9. The general information test described in this chapter is an excellent test for use in the identification of gifted children.

CHAPTER XII

SPECIALIZATION OF THE ABILITIES OF GIFTED CHILDREN

James C. DeVoss

The Problem

Both vocational and educational guidance must rest upon the counsellor's ability to estimate the equipment of the one being guided. This estimate must not be limited to the general bird's-eye view of the abilities of the child, but must include such precise statements as, "This boy is better in arithmetic to such and such a degree than he is in composition," or "better in history to such and such a degree than he is in literature." Since the gifted children represent high potentiality, our ability to make precise statements concerning their equipment is a matter of great consequence. It is to supply a basis for deriving such statements that this investigation was undertaken.

In regard to the specialization of abilities several important queries arise. Are gifted children more specialized than other children in their development? Are they one-sided in their development, or do their abilities lie on a uniformly high level? When one ability is highly developed, is this development at the expense of other abilities? The answers to these questions can be best read from precise descriptions of the surfaces of the abilities of the gifted children. These descriptions necessitate the accurate measurement of the abilities to be described.

The abilities under consideration are those which were measured by the Stanford Achievement Test, a group of four information tests and the Stanford-Binet Scale. This measurement is but a small sampling of the abilities of a child, but it includes those of considerable importance in school work. In the measurement of reading there are tests of word meaning, sentence meaning, and paragraph meaning. For arithmetic there are measures of computation and

of reasoning or problem solving. Of the other school subjects there are measures of Language Usage, of Spelling from dictation, and of information in science, in literature, in history and civics, and in music and art.

The use of these tests is best defended by the statistical treatment to which they have been subjected as described elsewhere[1] and here. Certainly the authors are justified in the statement that "these tests have . . . reliability coefficients which are very much higher than we are accustomed to find in the experimental literature on educational tests."

Method of Treatment of Data

The data treated in the following pages were secured as described on page 310. The arrangement of the data for the study of the unevenness of the abilities measured, demanded that the scores be expressed in units common to all of the tests. Several such units are available. Quotients, T scores, grade percentile scores, and z scores (or standard scores) were considered, with the result that the last named were adopted. The standard score expresses the distance from the mean of an age group in terms of the standard deviation of that group. Thus a standard score of 1.5 in Arithmetic Reasoning means that this score is 1.5 standard deviations above the mean for the age group in which the individual making the score was found.

Use was made of these standard scores in connection with four types of study: (1) The application of Kelley's[2] ratio $\sigma_{d.\infty w}$. This ratio is applied to a gifted and to a control group so that the unevenness of the two groups may be compared. (2) A general survey of the nature of the unevenness of the age groups of the gifted children, including some comparisons between the various achievement levels and the intelligence level as established by the Stanford-Binet test. (3) Several studies of types of unevenness of both gifted and control groups. (4) Case studies with the assistance of profile charts or psychographs.

[1]Stanford Achievement Tests, *Manual of Directions*, Kelley, Truman L., Ruch, Giles M., and Terman, Lewis M. World Bk. Co., 1923, p. 6.

[2]Kelley, Truman L. "A New Method for Determining the Significance of Differences in Intelligence and Achievement Scores." *Jour. Educ. Psych.* Vol. XIV, No. 6, September, 1923, p. 321.

For three of these methods there is no significant historical account other than the reference cited. The fourth, representing case studies and profile charts, has a rich historical background. The development of the method of case studies rests directly on the development of the method of measurement of human traits. The history of such measurement is too long to be recounted here, and it has been often presented in textbooks on the subject. The advantages of the profile method were first set forth by Rossolimo,[1] who employed tests of ten different functions. Each test was scored by means of a scale of ten steps, 0 representing just not any ability to do the test, and 10 representing perfect performance. Claparède[2] has justly criticised Rossolimo's method of scoring because of its arbitrary character and has suggested a profile based upon percentile scores. Bartsch[3] has extended the Rossolimo method by the addition of a number of tests, but the Rossolimo-Bartsch method still retains the weakness of the original method in its arbitrary graduation. In America the profile method has been used by many investigators. Courtis[4] employed it with his arithmetic tests, using scores for points on the profile and both grade norms and arbitrary standards for comparison. Kelley[5] used percentile charts for eleven dimensions in his study of delinquent boys. Several types of profile charts are described and illustrated by Hollingworth.[6] These she calls psychographs. The Stanford Achievement Test Manual gives instructions for constructing a profile based on subject ages. These are representative of the profile methods that have been used. None of these methods would be as suitable for the present purpose as the use of standard scores.

[1]Rossolimo, G. Die psychologischen Profile. *Klinik f. psychische u. nervöse Krankheiten,* VI, 3 u. 4; VII, 1; VIII, 2.

[2]Claparède, Edouard. Profiles psychologiques. *Archives de Psychologie,* XVI, 61, pp. 70–81.

[3]Bartsch, Karl. *Das psychologische Profil.* Carl Marhold Verlagsbuchhandlung, Halle an der Saale, 1922.

[4]Courtis, S. A. *The Courtis Standard Tests.* Detroit, 1914, pp. 45.

[5]Kelley, Truman L. *Mental Aspects of Delinquency.* University of Texas Bulletin, No. 1713; March 1, 1917, pp. 49 and 52.

[6]Hollingworth, Leta S. *Special Talents and Defects.* The Macmillan Co., New York, 1923.

A Comparison of a Gifted and a Control Group by the Use of Kelley's Ratio

The comparison of gifted with unselected children required a selection of two representative groups which should have similar opportunities for development of the abilities measured. As this study called for two hours of measurement of each child, and the calculation of 40 or more coefficients of correlation for each group, it was fortunate that data were already available for a group of 96 unselected children (from an eighth grade).[1] It remained to secure data from a suitable gifted group. The 643 gifted children show a very wide range of grade placement, of chronological age, and of mental age. A group of gifted eighth grade children would not be satisfactory because their scores would too often be close to or actually at the maximum possible with the Stanford Achievement Tests. It therefore seemed best to select a group which would represent about the same level of achievement as that represented by the eighth grade group. After an inspection of groups selected by the use of chronological age and grade placement as criteria, these criteria were abandoned and a group was selected on the basis of mental age. The range taken was from M.A. 14-0 to M.A. 15-5. This is roughly eighth grade ability. Inasmuch as the mental ability of a child largely determines school success and has considerable influence on school progress, this range of mental age assures a certain homogeneity. Furthermore

Table 113a.

Data Concerning the 100 Gifted Children Selected for Special Study

	Mental Age	Chr. Age	IQ	School Grade	Years in School
Mean	14.7 yrs.	9.86 yrs.	149.4	H. 5th	4.6
S.D.	.44 "	.6 "	9.23	1.57	.82
Range	1.5 "	2.6 "	44.0	5.0	4.5
Range	14.0–15.4	8.5–11.09	136–180	L. 3rd–H. 8th	2.5–7.0

the comparison contemplated in this study depends upon reliability coefficients and intercorrelations and does not rest on a comparison of the scores made by individual pupils;

[1]For these data the writer is indebted to Dr. Truman L. Kelley. The method of treatment is also Kelley's. See "A New Method for Determining the Significance of Differences in Intelligence and Achievement Scores." *Jour. Educ. Psych.* Vol. XIV, No. 6, September, 1923, p. 321.

hence the degree of homogeneity of opportunity represented by this selection of gifted children is the best obtainable. Table 113a gives the important facts concerning this group of gifted children.

In Table 114 are shown the scores made by five of the gifted children. This table illustrates the difficulty of judging the significance of the differences in abilities when they are expressed in terms of scores. The question, is E. A. better in Arithmetic Computation or in Arithmetic Reasoning, cannot be answered from this table. However, when the scores are given in terms of their distances above or below their respective age norms, such questions as the one asked may be answered. Table 115 gives the means, standard deviations, and reliability coefficients of the tests for the group of gifted children which was selected for this comparison.

TABLE 114.

SAMPLE SCORES ON THE TESTS USED

	E. A.	A. B.	G. A.	L. B.	E. B.
Arithmetic Computation	88	100	160	128	96
Arithmetic Reasoning	48	84	100	108	48
Word Meaning	55	56	67	77	60
Sentence Meaning	54	54	78	78	54
Paragraph Meaning	84	88	94	118	78
Language Usage	38	47	52	54	49
Spelling	88	130	174	170	116
Science Information	46	60	75	81	42
Lang. and Lit. Information	38	46	44	75	47
Hist. and Civics Information	19	50	45	64	22
Music and Art Information	16	25	29	38	21
Arithmetic Total	136	184	260	236	144
Reading Total	193	198	239	273	192
Information Total	119	181	193	258	132

Using the means and standard deviations of Table 115, the raw scores of Table 114 are changed so they state the distance which each score is above or below the mean in terms of the standard deviation of the distribution of such scores for this group. These standard scores for the five illustrative cases are given in Table 116. Thus the score of 88 in Arithmetic Computation for subject E. A. is equivalent to the standard score —1.059. (If z is the standard score,

$$z=\frac{\text{Score—Mean}}{\text{Standard Deviation}}. \quad \text{Therefore } z=\frac{88-111.7}{22.36}=-1.059)$$

TABLE 115.

DATA CONCERNING THE SPECIAL GIFTED GROUP

	Mean	Standard Deviation	Reliability Coefficients of the Tests for this Group
Arithmetic Computation	111.7	22.36	.898
Arithmetic Reasoning	76.71	17.78	.864
Word Meaning	57.68	9.32	.916
Sentence Meaning	54.43	11.198	.836
Paragraph Meaning	82.90	10.67	.768
Language Usage	37.37	8.41	.582
Spelling	124.80	21.69	.952
Science Information	56.85	13.51	.767
Language and Literature Information	47.65	11.99	.885
History and Civics Information	37.40	15.29	.863
Music and Art Information	21.55	6.44	.784
Arithmetic Total	188.60	35.19	.909
Reading Total	194.30	28.00	.924
Information Total	162.4	40.60	.960

These standard scores for the five subjects are given in Table 116. From this table we can answer the question concerning the interrelationship of the abilities of E. A. He is only a very little better in Arithmetic Computation than he is in Arithmetic Reasoning; the difference is .551 standard scores. Other differences in his abilities are also apparent. The difference between his scores in Paragraph Meaning and Arithmetic Reasoning is 1.51 standard scores. We shall call such differences as these *d's*. Then $d=z_1-z_2$, when z_1 is the standard score in one subject such as Paragraph Meaning and z_2 is the standard score in another subject such as Arithmetic Reasoning.

TABLE 116.

SCORES OF TABLE 114 EXPRESSED AS STANDARD SCORES

	E. A.	A. B.	G. A.	L. B.	E. B.
Arithmetic Computation	–1.059	– .52	2.16	.72	– .70
Arithmetic Reasoning	–1.61	.41	1.31	1.76	–1.61
Word Meaning	– .29	– .18	1.00	2.07	.25
Sentence Meaning	– .04	– .03	2.10	2.10	– .04
Paragraph Meaning	.1	.48	1.04	3.29	– .46
Language Usage	.07	1.14	1.74	1.98	1.37
Spelling	–1.70	– .24	2.26	2.08	– .41
Science Information	– .80	.23	1.34	1.79	–1.10
Language and Literature Information	– .80	– .14	– .30	2.28	– .05
History and Civics Information	–1.2	.82	.50	1.74	–1.00
Music and Art Information	– .86	.53	1.15	2.55	– .08
Arithmetic Total	–1.49	– .13	2.02	1.35	–1.26
Reading Total	.04	.16	2.59	2.78	– .08
Information Total	–1.07	.46	.75	2.35	– .75

A striking difference is that for L. B. Her score in Paragraph Meaning is 2.57 standard deviations above her score in Arithmetic Computation. Is this *d* a true, valid difference or is it a spurious difference occurring because the tests used are not perfectly reliable? Certainly if the test in Paragraph Meaning and the test in Computation both lack reliability the difference of 2.57 standard deviations may be spurious. Also the *d* of .03 between the *z* score for Word Meaning and the *z* score for Sentence Meaning for subject L. B. would seem to indicate that this pupil has practically the same

amount of ability in these two fields. If the tests for Sentence Meaning and Word Meaning were very unreliable a real difference might be hidden.

There is a test of the validity of these differences. Suppose that we had the true z scores found from the average of the z scores secured by taking the test an infinite number of times. Call this true z score for Paragraph Meaning z_∞ and the true z score for Computation z_w.

Then $z_\infty - z_w =$ the true d between Computation and Paragraph Meaning for L. B. What is the probable divergence of the obtained d's from these true d's? Kelley[1] has supplied the standard error for such differences. The formula is $\sigma_{d_{\infty w}} = \sqrt{2 - r_{1\text{I}} - r_{2\text{II}}}$ in which $\sigma_{d_{\infty w}}$ is the standard deviation of the difference between the true d $(z_\infty - z_w)$ and the successively obtained d's, using different forms of the same pair of tests on one individual; $r_{1\text{I}}$ is the reliability coefficient on one test, say, Computation, and $r_{2\text{II}}$ is the reliability coefficient of the other test, such as Paragraph Meaning in the case discussed above.

As Kelley has said, "This formula fills a long felt need, since it makes possible the determination of the probable errors of our judgments of differences of abilities within the individual."

The P.E. (of individual $z_1 - z_2$) $= .6745\sqrt{2 - r_{1\text{I}} - r_{2\text{II}}}$.

Table 117 shows the P.E. as calculated by this formula for our group of 100 and for all of the possible differences in scores.

Returning to the difference of 2.57 standard deviations encountered in the case of L. B. as the difference between her z scores in Paragraph Meaning and Computation, we can answer the question concerning the probable validity of this difference. From Table 117 we find the P.E. of this difference is .39. As the difference is 6.59 times as great as its P.E. we may conclude that it is a true difference. We may thus use the P.E. as a test of the differences encountered in the scores of individual children. The method opens important possibilities for vocational and educational guidance. We have frequently assumed that differences

[1]Kelley, T. L. A New Method for Determining the Significance of Differences in Intelligence and Achievement Scores. *Jr. Ed. Psych.* Vol. XIV, No. 6, September, 1923, pp. 321–334.

such as these exist, and achievement and educational quotients have seemed to support the assumption. With this formula we may give the assumption statistical precision.

Again referring to L. B. as an example, we may show some of the differences between her scores with probable errors, thus:

Difference,	Reading Total	- Arithmetic Total =	1.43	P.E.=.28
"	Spelling	- Arithmetic Total =	.73	P.E.=.25
"	Music and Art Information	- Arithmetic Total =	1.20	P.E.=.37
"	Information Total	- Arithmetic Total =	1.00	P.E.=.24
"	Music and Art Information	- Science Information =	.76	P.E.=.45
"	Language and Literature Information	- History and Civics Information =	.54	P.E.=.34
"	Music and Art Information	- History and Civics Information =	.81	P.E.=.40

Here is the case of a girl 11 years of age in the 7th grade, with an M.A. of 15 and an IQ of 142, who is definitely more proficient in Reading, in Literature, and in Art than in Arithmetic and Science.

This use of the probable errors may be extended indefinitely. Inasmuch as there are no probable errors in this table larger than .54, and the average of all the probable errors shown is .276, and since differences of 1.00 and greater are not uncommon in Table 116, there are good prospects for the location of many significant differences.

Before undertaking a detailed study of individuals it will be of interest to discover the proportion of cases which present significant differences. The method is also one devised by Dr. T. L. Kelley.[1] As pointed out by Kelley, "The frequency with which differences of various sorts are revealed by these fallible tests will not exactly parallel the importance of the differences in the natures of the pupils studied, because the tests are not equally reliable. Thus if given four

[1]Kelley, T. L. A New Method for Determining the Significance of Differences in Intelligence and Achievement Scores. *Jr. of Ed. Psych.*, Vol. XIV, No. 6, September, 1923, pp. 321–334.

TABLE 117.

PROBABLE ERRORS OF THE TRUE DIFFERENCES (P.E. $_{d_{\infty w}}$) OF INDIVIDUAL $Z_{\infty 1}$ Z_{w2}

	Arith. Comp.	Arith. Reas.	Word Mean.	Sent. Mean.	Par. Mean.	Lang. Usage	Spelling	Science Inf.	Lang. and Lit.	Hist. and Civics	Music and Art	Inf. Total	Read. Total
Arith. Reas.	.329												
Word Mean.	.291	.316											
Sent. Mean.	.348	.370	.335										
Par. Mean.	.390	.409	.379	.425									
Lang. Usage	.486	.502	.478	.515	.544								
Spelling	.261	.290	.245	.311	.357	.460							
Sci. Inf.	.390	.409	.380	.425	.460	.544	.357						
Lang. & Lit.	.314	.338	.300	.356	.397	.492	.272	.398					
Hist. & Civics	.329	.352	.317	.370	.410	.502	.290	.410	.338				
Music & Art	.380	.400	.370	.416	.452	.537	.347	.453	.388	.400			
Arith. Total			.282	.341	.383	.481	.252	.384	.306	.322	.374	.244	.276
Read. Total	.285	.311				.474	.238	.375	.295	.311	.365	.230	

traits, *a*, *b*, *c*, *d*, such that children intrinsically vary as much in the difference $a - b$ as in the difference $c - d$, and given further measures of *a* and *b* which are more reliable than those of *c* and *d*, then we will be able to discover and determine differences $a - b$ more often than differences $c - d$. We must therefore keep in mind that the ease with which differences are discovered by the aid of the Stanford Achievement Tests depends upon: first, the extent to which the individual's abilities differ, and, second, the reliability of the tests."

What proportion of the cases in our special group of 100 gifted children show differences of the type $z_1 - z_2$, which are so great as to be significant?

As we have seen, the standard deviation for differences such as $z_1 - z_2$ for an individual is $\sigma_{d.\infty w} = \sqrt{2 - r_{1\mathrm{I}} - r_{2\mathrm{II}}}$. In the case of L.B. we used this $\sigma_{d.\infty w}$ to test the probable verity of the difference between z_1 for Paragraph Meaning and z_2 for Computation. We found $\sigma_{d.\infty w} = .58$. If the standard deviation for the 100 similar differences found in our group should be the same as this it would be evident that the obtained differences are not greater than chance would indicate.

The usual formula for the standard deviation of a difference is $\sigma_d = \sqrt{\sigma_{z1}^2 + \sigma_{z2}^2 - 2r_{12}\sigma_{z1}\sigma_{z2}} = \sqrt{2 - 2r_{12}}$ in which σ_d is the standard deviation for the 100 differences and r_{12} is the correlation between the distributions of Paragraph Meaning and the Computation scores.

The correlation between the Paragraph Meaning and the Computation scores is .25. Then $\sigma_d = \sqrt{2 - 2(.25)} = 1.24$. Therefore, since $\sigma_{d.\infty w}$ is .58 and σ_d is 1.24, the obtained differences are greater than are accounted for by chance alone. To determine the proportion of cases greater than those due to chance[1] we first find the ratio $\frac{\sigma_{d.\infty w}}{\sigma_d} = \frac{.58}{1.23} = .47$, and we then enter Table 118 with this value to find that 35 per cent of the 100 cases of differences between Paragraph Meaning and Computation scores are greater than can be accounted for by chance.[2]

TABLE 118.

PROPORTION OF DIFFERENCES IN EXCESS OF THE CHANCE PROPORTIONS

	Proportion of differences in excess of the chance proportion		Proportion of differences in excess of the chance proportion		Proportion of differences in excess of the chance proportion
.02	95.0%	.35	46.7%	.70	17.1%
.05	88.8%	.40	41.5%	.75	13.8%
.10	79.8%	.45	36.7%	.80	10.8%
.15	71.9%	.50	32.3%	.85	7.8%
.20	64.7%	.55	28.1%	.90	5.1%
.25	58.2%	.60	24.2%	.95	2.5%
.30	52.2%	.65	20.5%	.99	0.5%

This situation is represented in Figure 11 in which the shaded area represents the proportion of differences which

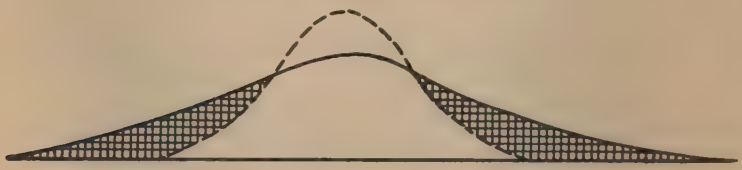
[1]Hereafter this percentage of cases showing differences greater than can be accounted for by chance will be spoken of as measurable disparity.

[2]Kelley, T. L. *Jour. Ed. Psych.*, September, 1923, p. 330.

are in excess of chance differences. The dotted curve represents a distribution with $\sigma_{d.\infty w}$ as the standard deviation, and the full line curve represents a distribution with σ_d as the standard deviation.

FIGURE 11.

SHOWING DISTRIBUTIONS OF FOUND AND TRUE DIFFERENCES BETWEEN SCORES



The full line curve represents the distribution of 100 differences of the type $z_1 - z_2$ with the standard deviation of 1.24. The dotted line indicates a distribution with its standard deviation of 0.47 or $\sigma_{d.\infty w}$ for the differences between z scores for an individual.

Using the intercorrelations of Table 119 and the reliability coefficients of Table 120, the ratio $\frac{\sigma_{d.\infty w}}{\sigma_d}$ is calculated for each pair of the seven achievement tests, and for the four information tests. Certain ratios between some of the total scores are added for the purpose of comparing general reading and arithmetic ability with the other scores. In all cases σ_d was larger than $\sigma_{d.\infty w}$, hence every comparison shows measurable disparity; that is, some differences greater than can be expected from chance variation. Table 120 presents the mean percentages of such differences. Arithmetic, Reading, and Information Totals are separated from the other percentages, as they obviously belong in another category.

The most significant fact in this table is that the 100 gifted children show measurable disparity for every pair of tests. For this group Music and Art Information and Language Usage show the least disparity. The mean of the percentages for the 55 comparisons involving the eleven tests is 29.3. Including the comparisons with Arithmetic Total, Reading Total, and Information Total adds 20 comparisons and changes the mean to 30.4. Hence Figure 11

TABLE 119.

INTERCORRELATIONS OF THE STANFORD ACHIEVEMENT TESTS FOR THE SPECIAL GROUP OF 100 GIFTED CHILDREN

	Arith. Comp.	Arith. Reas.	Word Meaning	Sentence Meaning	Paragraph Meaning	Language Usage	Spelling	Science Inf.	Language and Lit.	History and Civics	Music and Art	Inf. Total	Reading Total
Arithmetic Reasoning	.55												
Word Meaning	.34	.37											
Sentence Meaning	.30	.37	.75										
Paragraph Meaning	.25	.36	.54	.47									
Language Usage	.13	.10	.45	.45	.23								
Spelling	.54	.45	.54	.46	.46	.35							
Science Information	.29	.41	.47	.39	.24	.25	.41						
Language & Literature	.24	.38	.64	.49	.41	.30	.38	.55					
History & Civics	.44	.61	.62	.50	.39	.18	.54	.55	.66				
Music & Art	.30	.36	.59	.47	.34	.40	.44	.51	.60	.54			
Reading Total	.36	.43				.44	.57	.43	.60	.60	.54	.63	
Arithmetic Total			.44	.42	.37	.14	.63	.43	.38	.64	.41	.88	.46

with the shaded area showing 35 per cent involves only a little higher percentage than the type for this group.

The average percentage of differences which are in excess of the percentage due to chance for each of the 10 pairs having one test constant are shown in Table 121.

From Table 121 it is evident that spelling ability as measured by the Stanford Achievement Test develops more independently of the other tests than any of the other abilities measured. Computation is a close second. The mean of all the percentages in Table 121 is 29. The five tests which are above this mean are measuring abilities which are largely independent of any measured by the other tests.

TABLE 120.

THE PERCENTAGES OF DIFFERENCES IN EXCESS OF THE PERCENTAGES DUE TO CHANCE FACTORS

	Arith. Comp.	Arith. Reas.	Word Mean.	Sent. Mean.	Par. Mean.	Lang. Usage	Spell-ing	Science Inf.	Lang. and Lit. Inf.	Hist. and Civics	Music and Art	Inf. Total	Reading Total
Arith. Reas.	31%												
Word Mean.	44%	40%											
Sent. Mean.	38%	33%	17%										
Par. Mean.	35%	29%	25%	23%									
Lang. Usage	28%	28%	19%	18%	21%								
Spell-ing	41%	41%	43%	36%	32%	24%							
Sci. Inf.	33%	28%	28%	27%	28%	20%	38%						
Lang. & Lit.	43%	38%	30%	30%	29%	23%	45%	23%					
Hist. & Civ.	36%	25%	29%	28%	28%	26%	37%	21%	24%				
Music & Art	35%	30%	21%	23%	26%	16%	34%	19%	27%	23%			
Read. Total	45%	39%				20%	44%	30%	33%	32%	27%	42%	
Arith. Total			44%	34%	32%	29%	39%	26%	41%	27%	32%	14%	42%

Viewing tables 120 and 121 as descriptive of the group of 100 gifted children, it is clear that they have furnished a substantial percentage of valid differences for every pair of tests. Furthermore there is a hierarchy of differences for the eleven tests. The greatest average per cent of differences occurs for the series of ten pairs of tests which have spelling in common, the next largest for the Computation series, and the smallest percentage for the series which includes Language Usage as one member of each of the ten pairs.

It is clear that in the group of 100 gifted children there is a significant inequality in the development of the abilities

TABLE 121.

THE MEAN PERCENTAGE OF MEASURABLE DISPARITY FOR EACH TEST WHEN IT IS COMPARED WITH ALL THE OTHER TESTS

Constant Test	Percentage in Excess of Chance Percentage
Spelling	37%
Computation	36%
Reasoning	32%
Language and Literature Information	31%
Word Meaning	30%
History and Civics Information	27.6%
Paragraph Meaning	27.5%
Sentence Meaning	27%
Science Information	26%
Music and Art Information	25%
Language Usage	22%
Mean	29%

measured by the tests. Are these significant inequalities greater or less than those which would be encountered in an unselected or at least a less rigorously selected group of children?

Kelley's[1] investigation of 96 pupils from four Palo Alto eighth grades furnishes data for such a comparison.

Although the eighth grade children have been in school longer than our gifted group and are older chronologically, they probably do not average quite so high in mental age. The range of mental ages for the eighth graders is doubtless much greater than the 18 months' range of our gifted group. Just how these differences between the two groups would operate in their effect on the measurable disparity within individuals is difficult to say. Longer experience in school could be expected to bring up a child's ability in some of the subjects. For example, Arithmetic Reasoning, Spelling, and History and Civics Information, should be brought up toward the general level of an individual's ability by the rather uniform school training. On the other hand, given definite interests or stimuli for acquiring musical or literary information, the older eighth grade children have had several years in which to raise these functions above their general level.

[1]Kelley, T. L., opus cit.

Table 122 gives the data for 96 eighth grade children, together with the comparable data for the gifted. The upper figure in each cell is the percentage of differences in the test scores of individuals which is in excess of the chance differences for the gifted children, while the lower figure is the percentage for the eighth grade children. The mean percentage of difference for the eighth grade children is 28.2; for the gifted children it is 30.7. These means indicate slightly more of unevenness for the gifted children.

TABLE 122.

COMPARISON OF 100 GIFTED AND 96 CONTROL CHILDREN IN PERCENTAGE OF DIFFERENCES IN INDIVIDUAL TEST SCORES IN EXCESS OF THE CHANCE PERCENTAGE

	Arith. Comp.	Arith. Reas.	Word Mean.	Sent. Mean.	Par. Mean.	Lang. Usage	Spelling	Sci. Inf.	Read. Total
Arith. G	31%								
Reas. C	26%								
Word G	44%	40%							
Mean. C	37%	38%							
Sent. G	38%	33%	17%						
Mean. C	33%	33%	18%						
Par. G	35%	29%	25%	23%					
Mean. C	28%	27%	22%	17%					
Lang. G	28%	28%	19%	18%	21%				
Usage C	28%	28%	26%	18%	14%				
Spelling G	41%	41%	43%	36%	32%	24%			
C	27%	41%	44%	37%	32%	29%			
Sci. G	33%	28%	28%	27%	28%	20%	38%		
Inf. C	26%	18%	28%	22%	20%	24%	33%		
Read. G						20%	44%	30%	
Total C						20%	44%	26%	
Arith. G						29%	39%	29%	42%
Total C						29%	37%	20%	36%

There are 35 pairs of traits compared in Table 122, of which 13 pairs show variation of 1 per cent or less. If we do not count the 7 pairs which include the total scores we find the gifted children show greater unevenness in 15, or 54 per cent, of the compared pairs, and that the gifted and control groups have equal measurable disparity in 7, or 25 per cent of the comparisons. The children of the eighth

grade control group show greater measurable disparity in only 6, or 21.4 per cent of the pairs. If these differences between test scores are definitely related to intrinsic differences in traits, this is evidence that the gifted children are slightly more specialized and even more truly "real persons with specific and unique mental mechanisms" than are unselected children.

One reason for thinking the differences found may not be in perfect correlation with the true differences is the fact that these tests are not all equally reliable. We may estimate what the differences would be if all the tests were equally reliable. The mean reliability coefficient is .829 if all tests are weighted equally and the totals of Arithmetic, Reading, and Information are omitted.

The correlation between Arithmetic Reasoning and Arithmetic Computation is .551, but if the two tests were perfectly reliable this correlation would be

$$r_{\infty w} = \frac{r_{12}}{\sqrt{r_{1\mathrm{I}}}\ \sqrt{r_{2\mathrm{II}}}} = \frac{.551}{\sqrt{.898}\ \sqrt{.864}} = .626.$$

This $r_{\infty w}$ is the probable correlation between the true scores of the two traits. The formula is Spearman's formula for correction for attenuation.

But let us suppose that the two tests are equally reliable and that their reliability is .829, or the same as the mean reliability for all the tests. Then substituting their value for $r_{1\mathrm{I}}$ and $r_{2\mathrm{II}}$ and solving for r_{12} we have

$$r_{12} = .626\ \sqrt{.829}\ \sqrt{.829} = (.626)\ \ (.829) = .519.$$

Next we can find the ratio $\frac{\sigma_{d.\infty w}}{\sigma_d}$ for Arithmetic Computation and Arithmetic Reasoning under the assumed condition that their reliabilities are both .829.

$\frac{\sigma_{d.\infty w}}{\sigma_d} = \frac{\sqrt{2-.829-.829}}{\sqrt{2-2(.519)}} = .597$. Using this ratio to enter Table 119 we find .24, which is the measurable disparity between Computation and Arithmetic Reasoning if both tests have the reliability of .829. Table 123 is built up in this way. It shows the best estimate of what the relationships between the abilities of the children in this group would be if the reliabilities were all equal and all .829.

TABLE 123.

PERCENTAGE OF DIFFERENCES IN INDIVIDUAL TEST SCORES IN EXCESS OF THE CHANCE PERCENTAGE IN CASE THE RELIABILITY OF EACH TEST IS .829 (GIFTED CHILDREN)

	Arithmetic Computation	Arithmetic Reasoning	Word Meaning	Sentence Meaning	Paragraph Meaning	Language Usage	Spelling	Science Information	Language and Lit. Information	History and Civics Information
Arith. Reas.	24%									
Word Mean.	32%	30%								
Sent. Mean.	31%	31%	13%							
Par. Mean.	34%	31%	24%	26%						
Lang. Usage	37%	38%	25%	24%	33%					
Spelling	26%	29%	26%	28%	27%	30%				
Sci. Inf.	33%	29%	23%	29%	34%	32%	30%			
Lang. & Lit.	35%	31%	20%	26%	28%	31%	31%	23%		
Hist. & Civ.	29%	21%	21%	26%	30%	35%	26%	22%	18%	
Music & Art	32%	31%	21%	26%	31%	26%	29%	23%	20%	23%

The results of Kelley's application of this method to the eighth grade pupils, together with the comparable results from Table 123, are shown in Table 124.

Table 124 supplies another comparison of the two groups of children. The mean of all the per cents in Table 124 is 28.89 for the gifted group and 27.82 for the control group. In the 28 cells of this table we find the gifted children showing the larger percentage 13 times, the eighth grade children 12 times, and the two an equal per cent 3 times.

Comparing these findings with those recorded in Table 122, it appears that under the condition of uniform relia-

TABLE 124.

PERCENTAGES OF DIFFERENCES IN INDIVIDUAL TEST SCORES IN EXCESS OF THE CHANCE PERCENTAGE IN CASE THE RELIABILITY IS THE MEAN FOR THE GROUP

(Control group .824. Gifted group .829)

		Arith. Comp.	Arith. Reas.	Word Mean.	Sent. Mean.	Par. Mean.	Lang. Usage	Spelling
Arith. Reas.	G	24%						
	C	34%						
Word Mean.	G	32%	30%					
	C	39%	30%					
Sent. Mean.	G	31%	31%	13%				
	C	40%	26%	13%				
Par. Mean.	G	34%	31%	24%	26%			
	C	35%	26%	14%	17%			
Lang. Usage	G	37%	38%	25%	24%	33%		
	C	39%	33%	24%	23%	17%		
Spelling	G	26%	29%	26%	28%	27%	30%	
	C	31%	36%	28%	33%	25%	30%	
Sci. Inf.	G	33%	29%	23%	29%	34%	32%	30%
	C	35%	20%	24%	25%	21%	30%	31%

bility the gifted and control groups show less difference in the amounts of unevenness than they show as tested by the tests used. In Table 122 ten cells out of 28 show a difference of 1 or less, while in Table 124 eight cells show similar differences.

Table 125 shows the mean percentage of measurable disparity in each test when it is compared with all other tests.

The data of Table 125 show many interesting facts concerning the parallelism of development of the traits measured. Those which are most nearly parallel in their development as revealed in the tests of the gifted children, and their percentages of measurable disparity, are as follows:

Music and Art vs. Science Information	16%
Word Meaning vs. Sentence Meaning	17%
Language Usage vs. Sentence Meaning	18%
Language Usage vs. Word Meaning	19%
Music and Art vs. Science Information	19%
Language Usage vs. Science Information	20%

TABLE 125.

THE MEAN PERCENTAGE OF MEASURABLE DISPARITY FOR EACH TEST WHEN IT IS COMPARED WITH ALL THE OTHER TESTS

	Reliability .829	Rank	From Table 121	Rank from Table 121	Mean Rank
Arithmetic Computation	31.3%	1	36	2	1.5
Language Usage	31.1%	2	22	11	6.5
Paragraph Meaning	29.8%	3	27.5	7	5
Arithmetic Reasoning	29.5%	4	32	3	3.5
Spelling	28.2%	5	37	1	3
Science Information	27.8%	6	26	9	7.5
Language and Literature Information	26.3%	7	31	4	5.5
Music and Art Information	26.2%	8	25	10	9
Sentence Meaning	26.0%	9	27	8	8.5
History and Civics Information	25.1%	10	27.6	6	8
Word Meaning	23.5%	11	30	5	8

Showing most independence of development, or least parallelism in its relation to all other traits measured, is Spelling. In the case of Word Meaning and Spelling the disparity is 42.5, which raises the question whether the meaning of words and the spelling of words are not less intimately related than the majority of school subjects. When we find the mean of the percentages of measurable disparity between each test and all the others, Spelling has the largest percentage and Language Usage the smallest. This may be seen in Table 125, where these facts are given in the third column under the caption "From Table 121." From this table it is evident that the condition of uniform reliability considerably alters the rank order of the tests in their measurable disparity.

The condition of uniform reliability also affects the mean of the differences. Taking the reliabilities as found, the differences in Table 122 were greater for the gifted children in 54 per cent of cases, greater for the control group in 21 per cent of cases, and equal in 25 per cent. Under the condition of uniform reliability the paired comparisons of Table 125 show greater measurable disparity as follows: gifted, 46.4; control, 42.8; equal disparity, 10.7.

Although these results so far indicate a slightly greater unevenness for the gifted children, they must not be allowed to obscure the more important fact that both groups of children are characterized by considerable unevenness of their abilities as measured by these tests.

A Further Comparison by Means of Type Groups of Gifted and Unselected Children

The comparison just completed is based upon the reliability coefficients and the intercorrelations between the tests. A more direct and more nearly one to one comparison is desirable. Furthermore, the first comparison demanded that two groups be chosen, and it may be that other groups would show other results. The method used in the following study furnishes a check on the earlier method and at the same time throws light on the popular view as to the supposed compensatory distribution of abilities.

The problem of the specialization of abilities presents itself to the teacher and the parent in a way which is suggested by the descriptive terms, "good readers" and "poor readers," "good spellers" and "poor spellers," "good calculators." Let us assume that goodness and poorness in these terms are relative within one individual's equipment. Then a "good reader"[1] would be a pupil who could read better than he could spell, write, or calculate, regardless of his general mental level. If we limit our discussion to children showing such specialization we may then ask, "Are the 'good readers' among the gifted children more or less specialized than the 'good readers' among other children?" Popular opinion seems to hold that such specialization occurs more frequently among supernormal and subnormal children.

[1]Hereafter "good reader," "good calculator," etc., are used in the sense described above and hence do not refer to the relative "goodness" of these abilities as compared with the abilities of other pupils.

To make this comparison three groups of "good readers" were selected. First for a control group we have the 307 representative 12 year old children for whom we have scores from the Stanford Achievement Tests.[1]

The criterion of selection of "good readers" was the difference between the Standard Scores for the Reading Total and the Arithmetic Total. The difference between these scores was calculated for each of the 307 cases, and then the 20 showing the reading scores most in excess of their arithmetic scores were arbitrarily chosen as "good readers." Perhaps these were as much poor calculators as good readers but as the same method is used for selecting the "good readers" from the gifted children, it furnishes a valid basis for comparison. Table 126 shows the standard scores for the 20 "good readers" from the 307 representative 12 year old children. The mean grade location for these twenty 12 year old children is 6.77 grades, which is the equivalent of about the eighth month in the sixth grade, or May in the school year, if there were no high and low divisions.

Two groups of gifted children are compared with these 20 "good readers" selected from typical 12 year old children: (1) Twenty 12 year old gifted "good readers" whose standard scores are shown in Table 127; and (2) 20 sixth grade "good readers" whose standard scores are shown in Table 128. These gifted "good readers" were selected by the same method as that followed in the selection of the typical 12 year old children.

The 12 year old gifted children were selected because they have in common with the typical 12 year old children 12 years of experience. The gifted children have had a more extensive school training, since their grade placement ranges from the seventh to the ninth, with the mean in the low eighth, while the typical 12 year old "good readers" have a mean grade placement of high sixth and a range from high fourth to high eighth. This additional schooling, which averages a little more than a grade to each child, would seem to give the gifted children an opportunity for more varied development and hence greater specialization.

[1]For these data the writer is indebted to Professor Truman L. Kelley. These 12 year olds were selected from all of the grades from the 2nd through the 9th. They are a very representative sampling of 12 year old children.

TABLE 126.

STANDARD SCORES OF 20 TYPICAL 12 YEAR OLD "GOOD READERS"

	Sex	Grade	Language Usage	Spelling	Computation	Arithmetic Reasoning	Word Meaning	Sentence Meaning	Paragraph Meaning	Science Information	Reading Total	Arithmetic Total
J.W.	G	6.8	–.48	.24	–.05	–1.36	.33	.68	.68	–.16	.57	–.65
M.P.	G	6.7	.75	.24	–.39	.19	.81	.90	.96	1.02	.97	–.29
A.B.	B	7.8	.02	1.01	.28	– .97	1.05	.90	.68	1.02	.86	–.27
A.C.	G	6.3	.50	.77	–.05	.19	.33	–.01	–.17	.07	.04	–1.11
A.D.	B	7.8	.75	1.01	.67	.20	1.77	2.01	1.24	1.49	1.65	.43
A.P.	G	7.9	1.72	1.01	.28	.59	1.77	1.57	.96	.78	1.40	.43
A.E.	G	8.8	.75	2.02	–.05	.20	1.53	1.34	1.24	.78	1.36	.07
A.F.	G	7.8	1.24	1.26	–.05	.20	1.77	1.57	1.24	1.96	1.50	.07
A.G.	G	7.1	1.97	.75	.28	1.37	1.77	2.23	1.53	1.96	1.83	.80
M.C.	G	5.7	2.21	.50	.67	.20	1.77	1.79	.96	1.49	1.47	.43
C.S.	B	7.6	2.21	1.26	.28	.98	1.77	1.79	1.53	1.73	1.68	.62
C.A.	B	7.1	1.24	1.01	–.05	.59	1.29	1.34	.96	1.02	1.18	.25
J.D.	G	6.3	1.24	.75	.28	.20	1.29	1.12	.96	1.73	1.11	.25
T.S.	G	6.8	.26	–.26	–.05	.19	.81	.90	.96	.78	1.04	–.11
J.F.	G	6.7	.02	–.26	–.39	.19	.81	1.34	.68	.31	.93	–.29
J.G.	G	6.3	1.24	1.01	.96	.59	1.53	1.79	1.81	1.02	1.72	.80
J.H.	B	5.8	–.23	–.52	–.05	–.59	.08	.46	.11	.31	.61	–.29
M.G.	B	5.7	–.72	–.77	–1.07	–.97	–.16	.68	–.17	–.16	.11	–1.01
H.B.	G	5.7	–.23	–.77	–.39	–1.75	–.64	.43	.40	–.40	–.18	–1.01
H.A.	B	4.7	–.23	–1.28	–1.74	–.59	–.16	.23	–.74	.07	–.25	–1.20
Mean		6.7	.71	.45	–.03	–.02	.98	1.15	.79	.84	.98	–.10

TABLE 127.

STANDARD SCORES OF 20 GIFTED SIXTH GRADE "GOOD READERS"

Serial No.	Sex	Chr. Age	Lang. Usage	Spelling	Computation	Arith. Reas.	Word Mean.	Sent. Mean.	Par. Mean.	Sci. Inf.	Reading Total	Arith. Total
40	B	10.9	2.38	2.26	.62	.64	2.77	3.25	2.28	2.55	2.72	1.80
47	G	10.5	3.61	2.85	1.48	1.99	2.53	2.71	1.86	2.48	2.32	1.76
56	B	10.3	.62	1.97	.12	1.37	1.58	1.49	1.44	2.95	1.52	.48
84	G	9.8	4.84	3.73	3.34	2.48	3.95	3.16	3.26	4.59	3.43	2.96
116	B	8.7	4.00	3.20	2.37	5.11	4.26	4.36	3.68	4.59	3.99	3.40
134	G	11.2	1.88	1.70	1.21	1.17	2.32	1.81	1.04	2.08	1.70	1.18
139	B	10.4	2.55	2.73	1.60	3.02	2.89	3.31	1.69	4.18	2.88	2.24
195	B	11.3	1.88	1.55	.50	1.87	1.45	2.30	1.44	2.73	1.76	1.10
201	B	12.2	1.89	1.11	1.29	1.22	2.31	1.79	2.09	2.39	2.06	1.27
207	B	12.1	1.32	1.92	.62	1.53	1.83	1.23	1.43	.97	1.49	1.05
272	G	11.4	1.28	1.81	1.07	1.17	2.32	2.14	1.20	2.53	1.87	1.10
274	B	11.5	1.50	2.06	1.21	2.05	2.32	2.19	2.00	3.28	2.22	1.57
279	B	11.2	1.43	1.86	.50	1.87	1.34	1.87	1.12	2.18	1.46	1.10
294	G	9.8	1.86	2.88	2.21	2.25	2.31	3.81	2.40	1.53	2.74	2.21
309	B	11.6	2.25	2.57	.07	2.05	1.01	1.65	1.52	2.13	1.46	.94
370	G	11.4	2.33	1.19	.36	.47	1.78	2.36	1.84	2.13	2.04	.39
372	B	10.8	3.08	2.50	1.11	2.61	2.53	2.50	2.11	1.87	2.38	1.77
465	B	11.3	1.28	2.62	1.36	1.17	1.88	1.65	1.60	1.48	1.76	1.25
511	G	10.6	2.38	2.14	1.60	1.37	2.77	2.30	1.44	2.41	2.10	1.60
521	G	10.3	2.03	2.03	.86	2.61	2.29	3.58	1.94	2.07	2.52	1.60
Mean		10.86	2.22	2.23	1.18	2.05	2.32	2.47	1.82	2.46	2.22	1.54

TABLE 128.

STANDARD SCORES OF 20 GIFTED 12 YEAR OLD "GOOD READERS"

Serial No.	Sex	Grade	Lang. Usage	Spelling	Computation	Arith. Reas.	Word Mean.	Sentence Meaning	Paragraph Meaning	Science Inf.	Reading Total	Arith. Total
120	G	8.7	2.46	1.36	1.43	1.22	2.25	2.01	1.81	1.68	2.00	1.34
128	B	8.3	2.78	2.06	.05	2.31	2.55	1.79	1.62	2.10	1.95	1.05
135	G	7.3	2.46	1.36	1.02	1.53	2.37	1.68	1.53	2.44	1.83	1.27
137	G	8.8	1.48	1.26	.62	1.22	2.13	1.40	2.28	1.59	1.95	.91
140	G	7.8	1.97	.96	.05	.59	1.47	1.40	1.15	1.87	1.32	.25
253	B	7.7	2.46	1.87	.49	1.68	2.31	1.90	.68	2.29	1.56	1.05
276	B	7.8	1.07	1.92	1.02	1.68	2.25	1.90	1.34	1.40	1.79	1.34
297	G	7.7	1.80	2.12	.75	1.06	2.01	2.12	1.62	1.92	1.90	.91
302	G	8.2	2.62	2.22	1.16	1.53	2.37	2.12	1.81	1.63	2.08	1.34
307	G	7.7	2.13	1.46	.89	2.00	2.07	1.79	1.81	2.06	1.88	1.41
320	B	7.8	2.05	1.82	1.16	1.53	1.77	1.79	1.90	1.40	1.84	1.34
326	G	8.7	2.62	1.82	.89	.90	2.31	1.84	2.19	2.10	2.11	.91
368	B	8.3	2.13	2.43	1.29	.75	2.37	2.01	1.15	1.87	1.79	1.05
385	G	7.2	2.62	1.72	.75	1.84	2.07	1.90	1.43	1.73	1.77	1.27
406	G	8.8	2.13	1.77	.89	2.00	2.07	1.68	2.28	2.15	2.02	1.41
427	G	8.2	2.13	1.77	1.29	1.53	2.49	2.12	2.56	1.92	2.41	1.41
472	G	7.7	1.64	1.31	.49	1.06	2.07	2.18	2.28	1.40	2.18	.76
490	B	7.3	1.64	1.82	.62	2.31	1.95	2.12	1.62	1.59	1.88	1.41
494	G	9.3	2.78	2.22	.89	1.84	2.43	2.12	3.04	1.63	2.06	1.34
545	B	8.7	2.78	2.07	1.02	1.84	2.25	2.01	2.09	2.20	2.11	1.41
Mean		8.1	2.18	1.76	.84	1.52	2.18	1.89	1.81	1.85	1.90	1.15

This expectation is not fulfilled, as we shall see when we examine the data of Table 129.

The sixth grade gifted "good readers" (Table 128) were selected for comparison with the typical 12 year old "good readers" because the latter have a mean grade placement of 6.77, or high sixth grade. Then sixth grade gifted "good readers" probably have a school experience and training quite similar to that of the typical 12 year old "good readers."

From these three tables (126, 127, and 128) we may secure the numerical equivalence of a composite photograph of the profile charts of each group of 20 "good readers." This composite photograph for each group is described by the mean standard scores given at the bottom of its table. These mean scores assembled in one table (Table 129) give an opportunity for a direct comparison of the three groups.

TABLE 129.

NUMERICAL PROFILES OF THREE GROUPS OF "GOOD READERS"

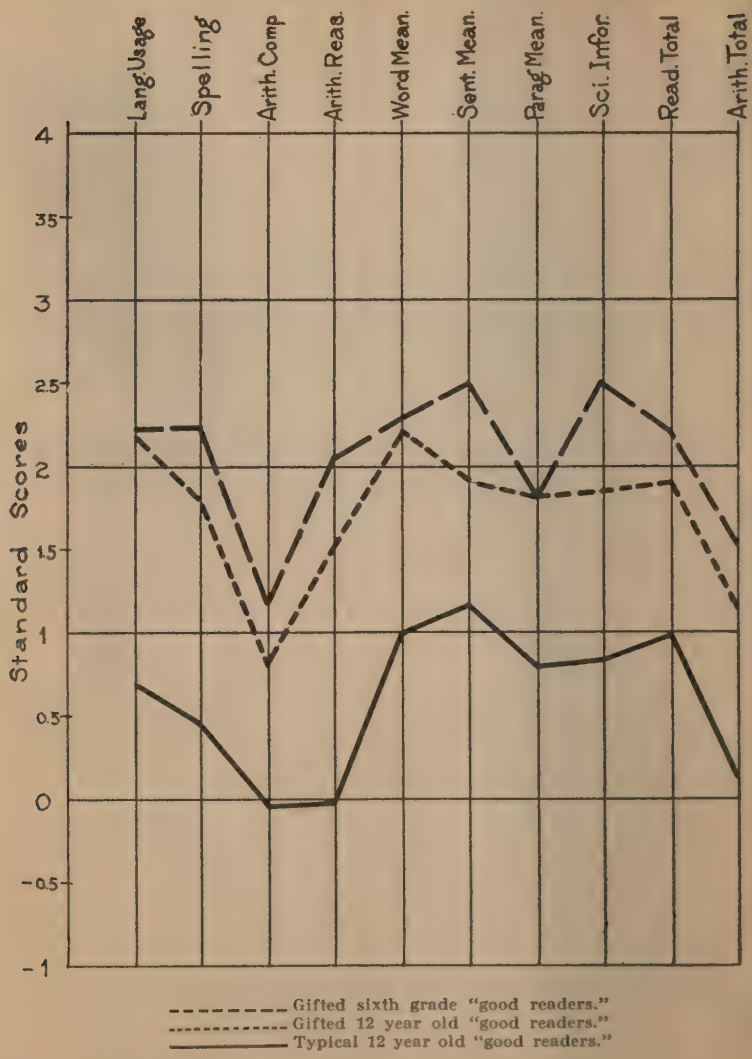
Good Readers	Lang. Usage	Spelling	Comp.	Arith. Reas.	Word Mean.	Sent. Mean.	Par. Mean.	Sci. Inf.	Read. Total	Arith. Total
12 yr. old gifted	2.18	1.76	.84	1.52	2.18	1.89	1.81	1.85	1.90	1.15
Typical 12 yr. olds	.71	.45	–.03	–.02	.98	1.15	.79	.84	.98	.10
6th grade gifted	2.22	2.23	1.18	2.05	2.32	2.47	1.82	2.46	2.22	1.54

From Table 129 and Figure 12 it is apparent that the gifted good readers are superior to the typical 12 year old children in all the abilities measured.

An inspection of the three composite profiles of Figure 12 does not reveal any marked differences in unevenness. But there is a defect of such graphical representation. Obviously, in this picture the emphasis is on the differences between the standard scores for adjacent ordinates, such as Language Usage and Spelling, while the differences between non-contiguous ordinates such as Language Usage and Science Information is almost lost to view. To bring out these concealed differences tables 130 and 131 have been prepared. In these tables the differences between the mean standard scores are expressed in terms of standard scores.

FIGURE 12.

PROFILES OF THREE GROUPS OF "GOOD READERS"



They could be expressed in terms of the standard errors or the probable errors of such differences ($\sigma_{d.\infty w}$ or P.E. $_{d.\infty w}$), but such standard errors would be the same for all the scores of 12 year old children and but slightly different for 9, 10, and 11 year old children of the sixth grade group and hence would not materially change our comparisons.

TABLE 130.

DIFFERENCES BETWEEN MEAN STANDARD SCORES OF 20 TYPICAL 12 YEAR OLD "GOOD READERS" AND 20 GIFTED 12 YEAR OLD "GOOD READERS"

		Lang. Usage	Spelling	Computation	Arith. Reas.	Word Mean.	Sent. Mean.	Par. Mean.	Sci. Inf.
Spelling	G	.42							
	C	.26							
Computation	G	1.34	.92						
	C	.74	.48						
Arithmetic Reasoning	G	.66	.24	.68					
	C	.73	.47	.01					
Word Meaning	G	.00	.42	1.34	.66				
	C	.27	.53	1.01	1.00				
Sentence Meaning	G	.29	.13	1.05	.37	.29			
	C	.44	.70	1.18	1.17	.17			
Paragraph Meaning	G	.37	.05	.97	.29	.37	.08		
	C	.08	.34	.82	.81	.19	.36		
Science Information	G	.33	.09	1.01	.33	.33	.04	.04	
	C	.13	.39	.87	.86	.14	.31	.05	
Mean	G	.49	.32	1.04	.46	.49	.32	.31	.31
Mean	C	.38	.45	.73	.72	.47	.62	.38	.39

The standard errors ($\sigma_{d.\infty w}$) for 12 year old children never rise above 60 and are usually below 50, hence we may think of the differences expressed in our present study as multiplied by 2 if we wish to think of their probable validity.

In Table 130 the differences between the mean scores in Language Usage and Spelling are .42 standard deviation for the gifted and .26 for the control group. Hence the difference between these two scores is greater in the case of the gifted group. There are 28 such comparisons in this table exclusive of those involving the Arithmetic Total and Reading Total scores by which the groups were selected. In these 28 comparisons the differences are greater for the control

TABLE 131.

DIFFERENCES BETWEEN THE MEAN STANDARD SCORES OF 20 TYPICAL 12 YEAR OLD "GOOD READERS" AND 20 GIFTED SIXTH GRADE "GOOD READERS"

		Lang. Usage	Spelling	Computation	Arith. Reas.	Word Mean.	Sent. Mean.	Par. Mean.	Sci. Inf.
Spelling	G	.01							
	C	.26							
Computation	G	1.04	1.05						
	C	.74	.48						
Arithmetic Reasoning	G	.17	.18	.87					
	C	.73	.47	.01					
Word Meaning	G	.10	.09	1.14	.27				
	C	.27	.53	1.01	1.00				
Sentence Meaning	G	.25	.24	1.29	.42	.15			
	C	.44	.70	1.18	1.17	.17			
Paragraph Meaning	G	.40	.41	.64	.23	.50	.65		
	C	.08	.34	.82	.81	.19	.36		
Science Information	G	.24	.23	1.28	.41	.14	.01	.64	
	C	.13	.39	.87	.86	.14	.31	.05	
Mean	G	.33	.33	1.04	.36	.34	.43	.50	.42
Mean	C	.38	.45	.73	.72	.47	.62	.38	.39

group 16 times, and greater for the gifted group 12 times. At the bottom of this table are displayed the means of the differences between each test and all the other tests. Thus the mean of all the differences between Language Usage and the other test scores for the gifted group is .49, and for the control group it is .38. Of such means there are 8 if we again exclude all differences which involve total scores in Arithmetic and Reading. Of these 8 differences 5 are greater for the control group and 3 are greater for the gifted group. If we add all the 28 differences for the control group the total is 14.51, while for the gifted group it is 13.11. Therefore by every comparison, the composite profiles of gifted 12 year old "good readers" show slightly less of unevenness or specialization than does the composite profile of typical 12 year old "good readers."

A similar analysis of Table 131 indicates that the composite profile of the 20 gifted sixth grade "good readers" also shows slightly less of unevenness than does the composite

profile of the 20 typical 12 year old "good readers." The comparisons used in Tables 130 and 131 are summarized below.

	Total Differences	Differences Greater	Means for each test
Gifted 12 year olds	13.11	12	3
Typical 12 " "	14.51	16	5
Gifted sixth graders	13.05	12	3
Typical 12 year olds	14.51	15	5

"Good readers" if they represent a type, must be one of many types. Since they were selected with reference to their total scores in Arithmetic, it is interesting to examine their complementary type which we shall call "good calculators." Here again our term may be a misnomer, for these may be poor readers as well as good calculators, but they are good in arithmetic when their arithmetic scores are compared with their reading scores. Again three groups were selected, typical 12 year olds, gifted 12 year olds, and gifted sixth graders.

The composite profiles of these three kinds of "good calculators" are given in Figure 13.

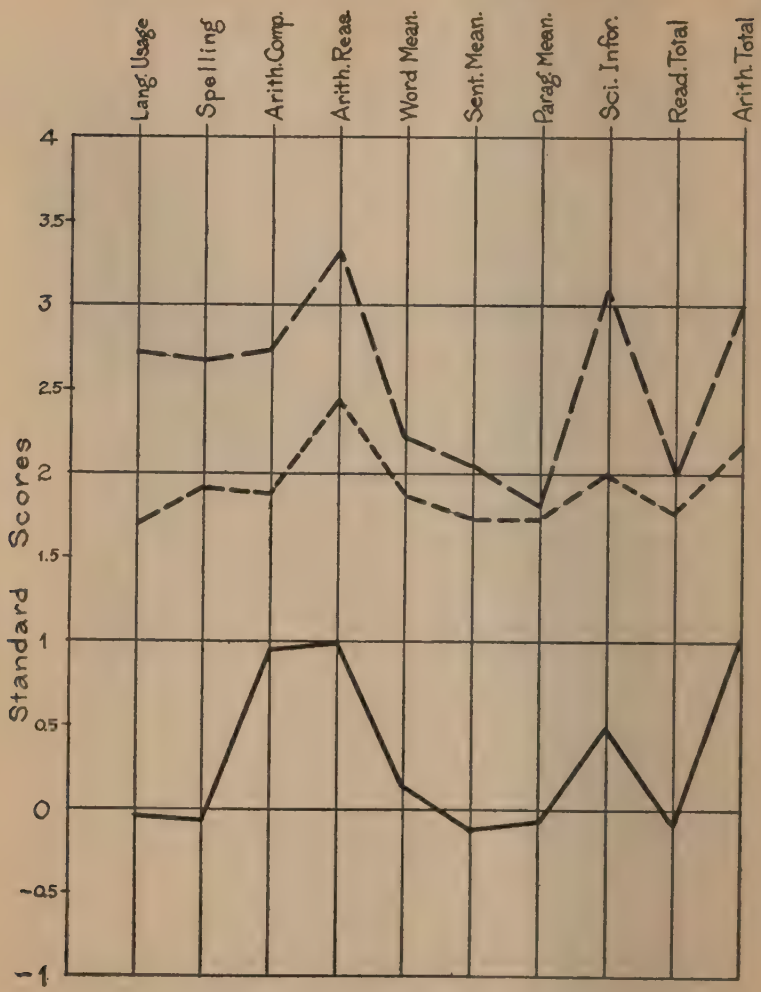
As in the case of the "good readers" the profiles of the gifted children who are "good calculators" show a tendency for Arithmetic Reasoning to be higher than Computation.

When typical 12 year old "good calculators" are compared with the gifted 12 year old "good calculators," it develops that there is more of unevenness in the control group. Of the 28 paired comparisons, one pair shows the same difference for the two groups, 4 show greater differences for the gifted, and 23 show greater differences for the typical 12 year old children. The total of the 28 differences for the control group is 14.82, while the total for the gifted group is 6.99. All of the mean differences for one test compared with all others are greater for the control group.

How do the gifted sixth grade "good calculators" compare with unselected 12 year old "good calculators" in specialization of abilities? This comparison reverses the one just given. Here we find but 12 of the 28 pairs of differences to be greater for the control group and 16 greater for the gifted sixth graders. The total of the 28 differences for the gifted sixth graders is 17.63, as compared with the total

FIGURE 13.

PROFILES OF THREE GROUPS OF "GOOD CALCULATORS"



---------Gifted sixth grade "good calculators."
----------Gifted 12 year old "good calculators."
_____Typical 12 year old "good calculators."

for the control group of 14.82. The means of each test against all others are greater for the gifted in 7 cases and greater for the control group in one. All of the evidence here is indicative of greater unevenness for gifted sixth grade "good calculators" than for unselected 12 year old "good calculators."

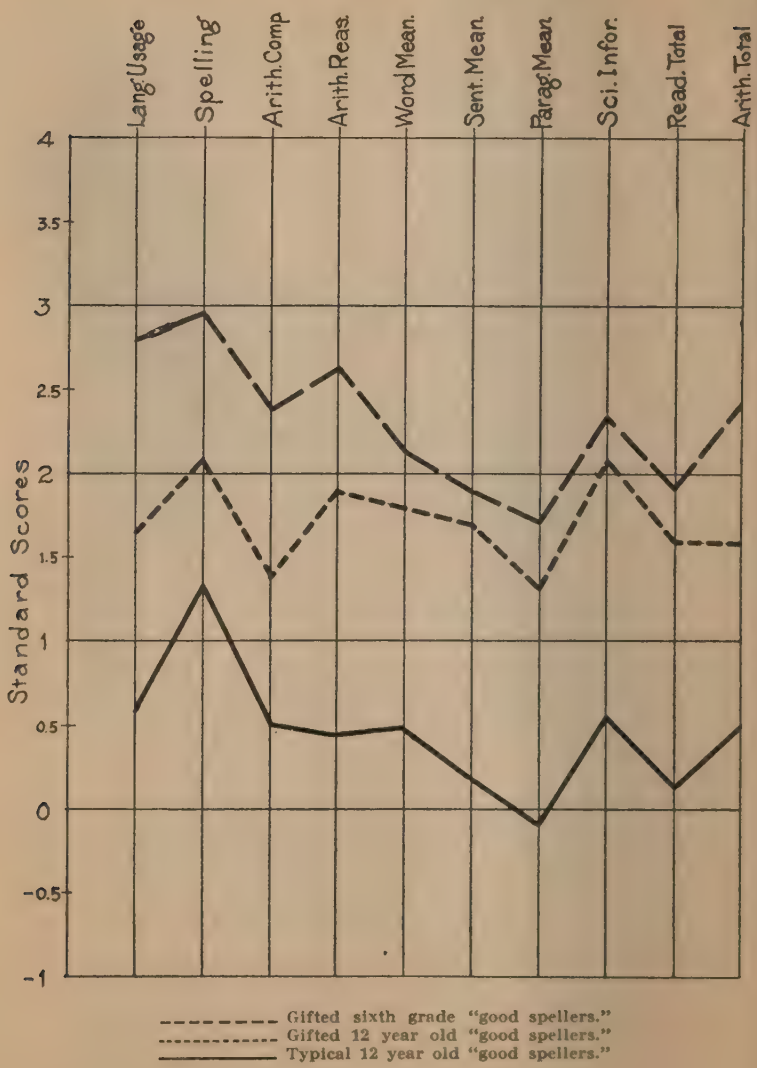
The selection of "good readers" and "good calculators" is based upon total scores in Reading and in Arithmetic, respectively. In each selection the differences considered are consequently differences between total scores, which in their turn are based upon tests having considerable independence. Because of this use of total scores, it seemed advisable to use another selection based upon a comparison with the Spelling scores. Three groups were chosen, because in their respective larger groups they showed the greatest differences between the score in Spelling and that in Reading Total. We have called these groups "good spellers." The groups from which these "good spellers" were taken are the same that were used before: typical 12 year old children, gifted 12 year old children, and gifted sixth grade children.

The composite profiles of these three selections of scores are found in Figure 14. The three profiles are nearly parallel. A summary of the differences adds to this graphic testimony that the three groups have similar unevenness. Comparing the typical group with the gifted 12 year old children reveals 15 of the 28 differences to be greater for the gifted and 13 greater for the typical children. Of the mean differences when one test is compared with all others, 5 are greater for the control group and 3 for the gifted. If there is any difference between these groups it is in favor of slightly greater unevenness for the control group, but the difference is negligible.

The gifted sixth grade "good spellers" are more uneven than the typical 12 year old "good spellers." This result is more definite than that of the preceding comparison. In the 28 pairs the gifted show greater differences 17 times, and of the 8 means when one test is compared with all others 7 are larger for the gifted group.

FIGURE 14.

PROFILES OF THREE GROUPS OF "GOOD SPELLERS"



Conclusion from the Two Methods of Comparison

We can now bring together the results of the comparison by means of Kelley's ratio and the comparison of the groups of 20 each by means of composite profiles.

The first method shows the gifted to be slightly more uneven, although the difference in unevenness is not so significant as the resemblance. In other words, the fact that both the eighth graders and the gifted children show significant unevenness is the most important conclusion. In comparing the first method with the second (the threefold selection), it must be recalled that the latter method deals with the comparison of the differences between obtained standard scores. It is probable that the first method is to be relied upon as giving the more trustworthy estimate, since it deals with the best estimates of the true scores. The study of the composite profiles attempts to select types and compares gifted and control children of approximately the same type.

It is conceivable that the slightly greater unevenness of the group of gifted children with M.A. 14-15.4, as compared with eighth grade children, is due to the criterion of selection. On the other hand, the threefold comparisons show greater unevenness for the gifted children in two out of the six comparisons made. It is possible that a selection of other types on the same principle would show an equal amount of unevenness for the gifted and control groups, and it is even possible that gifted groups might show greater unevenness in a majority of the types selected. The lack of conspicuous differences between gifted and unselected children in the specialization of the abilities is the outstanding fact. Gifted children are unique individuals, but unselected children are no less so. Gifted children may be more successful specialists and thus attract more attention, but it should be observed that they are superior in all abilities. On the other hand, children of ordinary or mediocre general intelligence often possess specialized abilities that are overlooked because they are not so conspicuous as when they appear in the gifted specialist. Children on all levels of mental ability must be recognized as unique individuals with unique educational and vocational needs.

Nature of the Unevenness in the Abilities of Gifted Children

The conclusion that neither superior nor ordinary intelligence is predictive of types of unevenness, leaves us the task of the description of the unevenness of individual children. When this is accomplished for our gifted group there are numerous possibilities of studying these descriptions in various combinations.

It will be recalled that the 643 gifted children were tested by means of 12 tests, the 7 tests of the Stanford Achievement battery, 4 tests from an information battery, and the Stanford-Binet. The scores from these tests are used in the following study. As age groups below 6 and above 13 were represented by few cases only, the scores of children between and including these ages were used. A few incomplete scores made it necessary to reduce the group to about 550, the number varying slightly in various portions of the treatment.

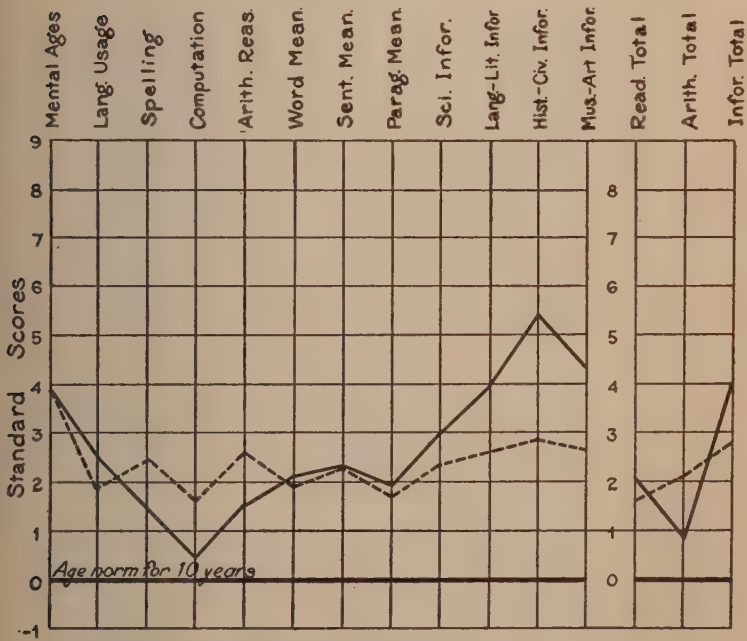
The composite profiles used in the preceding section represent the graphic method of description of the surface of abilities. A similar profile was prepared for each child studied. Figure 15 illustrates this type of profile chart.

Figure 15 is the profile for A. K. The heavy line at "0" standard score represents the average scores made in the various tests by 10 year old children. (These average scores are given in Table 133, page 344.) The lines running parallel to the line of the mean scores mark off standard scores above and below the means. Thus the standard score on the ordinate for Mental Age is a little less than 4, indicating that A. K's mental age is nearly 4 standard deviations above the average M.A. for 10 year old children.

The scores from tests of Paragraph Meaning, Word Meaning, and Sentence Meaning were added to make up the score for Reading Total; the scores for Computation and Arithmetic Reasoning were added to make up the Arithmetic Total. Similarly the scores on the information tests were combined to make the Information Total. Hence the scores for Reading Total, Arithmetic Total, and Information Total are separated by a space to indicate that they are in a different category from the other scores. The solid line which crosses the page in a very irregular course connects

the points which represent A. K's scores on the tests indicated. This line is A. K's profile of abilities in so far as we have measured them. It starts at the left from a point on the perpendicular which represents a Stanford-Binet M.A. of 14-10, which is the equivalent of a standard score of 3.8. This

FIGURE 15.
PROFILE OF A. K.
(Boy; age, 10–3; mental age, 14–10; IQ, 144; grade, high 4.)



Solid line indicates obtained standard scores.
Broken line indicates age equivalents for mental age.

line finds its lowest point at Computation. On the other hand A. K's score in History and Civics Information is more than 5 standard deviations above the mean. All of his scores in the information tests are well above their means. Thus the distances on the perpendicular lines between the line of the means and the profile line are the measure of the dif-

ferences between A. K's accomplishment and the average accomplishment of 10 year old children.

Some might wish to compare a pupil's accomplishment with the average accomplishment of children of the same intelligence level. This comparison has been attempted by means of the accomplishment quotient. Such a comparison is found in Figure 15. The dotted line on A. K's profile crosses points which are the age equivalents in scores on the several tests corresponding to M.A. 14-10. That is, these age equivalents are estimated to be the average scores of children 14 years, 10 months old. It must be remembered, however, that the units of comparison along the perpendicular lines are not the standard deviations for the distributions of scores made by 14 year old children, but are still the standard deviations for 10 year old children. We know that it is the tendency for standard deviations of the older age groups to grow greater, hence A. K's profile plotted on a form prepared from data secured from 14 year old children would show the profile line to be nearer the line of the means than it is to the broken line in Figure 15. While the data for 14 year old children are not available, the data for 13 year old children make it possible to plot this profile on the chart for the latter. The result indicates that the profile is much more even than it is in Figure 15.

In the profile of Figure 15 there are numerous conspicuous differences. It appears that the score in History and Civics Information is much higher (about 5 S.D's) than the score in Computation. On the other hand, the difference between the score in Word Meaning and that in Sentence Meaning is not large. How large must a difference be before we can pronounce it a true difference, independent of such factors as the unreliability of the tests? We must answer this by use of the standard deviation of such differences. Kelley's formula $\sigma_{d\ \infty w}=\sqrt{2-r_{11}-r_{2II}}$ supplies the standard error needed. These standard errors were calculated for all possible differences between test scores for the age groups 6 to 13 inclusive. Space does not permit the publication of these here. They are on file in the Library at Stanford University.

The construction of the profiles also made necessary the calculation of means, standard deviations, and reliability coefficients for each test for each age group. In the case of the

Stanford Achievement Tests these calculations were made from the groups on which the tests were standardized. Other groups were used for calculating the reliability coefficients for the Information Tests and for the Stanford-Binet. These data are shown in tables 132, 133, and 134.

TABLE 132.

STANDARD DEVIATIONS OF AGE-GROUP DISTRIBUTION FOR TESTS AS INDICATED

Age Groups	7	8	9	10	11	12	13
Stanford-Binet Months	10.07	12.61	12.95	13.74	18.51	18.47	20.87
Paragraph Meaning	12.85	20.00	22.80	24.00	25.25	21.20	23.00
Sentence Meaning	7.42	10.59	13.80	14.80	18.40	18.00	19.60
Word Meaning	6.28	11.10	14.60	16.80	18.36	16.60	18.80
Arithmetic Computation	15.00	22.80	24.80	32.80	26.65	29.60	30.00
Arithmetic Reasoning	9.40	13.90	17.60	19.32	21.96	25.60	28.87
Language Usage	11.50*	11.50	8.05	11.35	13.30	12.24	14.20
Spelling	21.25	26.73	28.20	35.08	39.08	39.40	43.10
Science Information	6.17*	6.17	13.39	14.71	19.97	21.12	21.72
Language and Literature Information	5.68*	5.68	9.33	9.87	15.90	18.30	20.12
History and Civics Information	3.8*	3.80	5.83	10.13	15.26	20.37	20.67
Music and Art Information	2.80*	2.80	3.67	4.31	6.41	8.40	9.03
Information Total	15.78*	15.78	32.22	36.57	55.40	65.79	69.49
Reading Total	26.55	41.29	49.32	56.4	60.10	55.60	61.10
Arithmetic Total	24.00	36.66	35.97	51.2	50.80	55.20	58.40

* Standard deviation for 8 year group used, as there were no data on unselected 7 year olds.

With the standard errors let us examine the differences found in Figure 15 (A. K's profile). Let us take the difference between any two scores, such as Paragraph Meaning 1.94 and Arithmetic Computation .38. Here the difference is

TABLE 133.

MEAN SCORES FOR TESTS AND AGE GROUPS AS INDICATED

Age Groups	7	8	9	10	11	12	13
Stanford-Binet Years	7.5	8.5	9.5	10.5	11.5	12.5	13.5
Paragraph Meaning	7.8	18.4	31.6	45.4	55.6	63.6	70.2
Sentence Meaning	5.0	10.0	17.4	24.9	33.6	39.8	48.0
Word Meaning	3.3	8.7	17.3	26.5	36.4	42.6	49.4
Arithmetic Computation	16.0	34.0	49.2	71.6	86.0	101.6	108.0
Arithmetic Reasoning	8.0	17.6	28.4	41.6	49.2	64.8	73.6
Language Usage	–1.0	2.0	7.0	13.0	21.0	23.8	28.4
Spelling	24.5	39.6	56.8	74.6	81.4	110.3	129.8
Science Information	–1.0*	6.7	14.5	22.5	30.5	38.5	46.0
Language and Literature Information	3.0*	8.4	13.8	18.5	23.5	30.5	37.0
History and Civics Information	–2.5*	3.7	7.1	13.0	19.5	26.5	33.5
Music and Art Information	0.0*	3.9	6.6	8.4	11.0	14.1	16.4
Information Total	0.0*	20.5	42.0	62.0	84.5	107.5	130.5
Reading Total	17.0	37.5	66.5	96.5	125.5	146.0	167.5
Arithmetic Total	24.0	52.0	78.0	112.0	136.0	166.0	182.0

* Means estimated from a smoothed curve.

1.56 standard deviation. We find the standard error of such a difference to be .37. Then the obtained difference of 1.56 standard deviations of the distributions is actually $\frac{1.56}{.37}$ or 4.22 standard deviations of such a difference. Hence the probability of this difference being as small as 0 is .00003. This method of reasoning may be applied to any of the differences encountered in such a profile. If it were applied to all of the differences in each of the 550 profiles it would fill 550 tables each having 105 entries. For this obviously too cumbersome procedure we may substitute rough approximate mental calculations in our scrutiny of the profiles and

TABLE 134.

RELIABILITY COEFFICIENTS FOR AGE GROUPS AND TESTS AS INDICATED

Age Groups	7	8	9	10	11	12	13
Stanford-Binet M.A.	.92	.92	.90	.93	.93	.94	.91
Language Usage	.76	.76	.76	.75	.77	.80	.83
Spelling	.92	.95	.92	.95	.96	.95	.96
Computation	.87	.90	.92	.92	.89	.85	.85
Arithmetic Reasoning	.87	.84	.87	.88	.87	.90	.91
Word Meaning	.94	.95	.94	.96	.92	.94	.96
Sentence Meaning	.91	.89	.89	.87	.89	.88	.89
Paragraph Meaning	.92	.95	.95	.94	.92	.90	.91
Science Information	—	.65	.87	.87	.90	.90	.91
Language and Literature	.67	.67	.69	.78	.87	.91	.91
History and Civics	—	.60	.52	.73	.81	.94	.91
Music and Art	—	.58	.48	.64	.72	.75	.88
Reading	.95	.95	.96	.96	.93	.96	.96
Arithmetic	.88	.93	.93	.92	.90	.93	.93
Information	—	.85	.89	.94	.89	.96	.91

more precise calculations when we wish to study one case intensively or many cases as a composite profile. An example of the quick examination is furnished by attempts to discover the valid differences in Figure 15. A. K. appears to be more proficient in reading than he is in arithmetic. His score in Reading Total is about 1 1/3 standard deviation above his score in Arithmetic Total. The standard error of this difference is .35; hence the difference is 3 or 4 standard errors, which is enough to warrant its validity. With standard errors in the neighborhood of .4 for differences between the three reading tests, and differences in the profile of less than .3 *z* scores, we may conclude that A. K's abilities are very even in Word Meaning, Sentence Meaning, and Paragraph Meaning.

ACHIEVEMENT LEVELS AND INTELLIGENCE LEVELS

The mean educational quotient of the main group of 643 gifted children was found to be about 140, and the mean IQ about 150. This difference between the achievement level and the intelligence level of the gifted children is very significant if it be a true difference. The method described in the preceding section may be applied here to test this difference. The procedure is simple.

The difference between the standard score for an achieve-

ment test and the standard score for the Stanford-Binet Test is expressed as positive when the Stanford-Binet score is higher, and negative when the Stanford-Binet score is lower than the Achievement score. These differences were calculated for all of the gifted subjects. Each difference was then divided by the standard error of that difference $\left(\frac{d}{\sigma_{d \infty w}}\right)$ and the results tabulated by age groups. The means of these results are given in Table 135.

TABLE 135.

PROBABILITY OF DIFFERENCES BETWEEN THE STANFORD-BINET SCORES AND THE SCORES OF THE SEVERAL ACHIEVEMENT TESTS EXPRESSED IN TERMS OF THE AVERAGE OF $\frac{d}{\sigma_{d \infty w}}$ FOR ALL THE GIFTED CHILDREN

Age Groups	7	8	9	10	11	12	13
Language Usage	–5.64	–3.13	–1.57	–3.97	–4.00	–2.77	–2.38
Spelling	–5.35	–4.74	–4.30	–6.67	–5.45	–4.26	–3.74
Computation	–3.73	–4.63	–5.51	–7.40	–4.30	–4.22	–3.21
Arithmetic Reasoning	–2.28	–2.44	–3.96	–4.69	–2.35	–3.38	–2.90
Word Meaning	–1.92	–2.99	–4.95	–6.70	–4.17	–3.82	–3.51
Sentence Meaning	–4.23	–3.09	–4.60	–4.60	–3.75	–3.60	–3.48
Paragraph Meaning	–3.30	–4.87	–5.85	–7.09	–4.91	–3.90	–3.59
Science Information	–2.56	+ .62	–3.36	–3.86	–3.43	–3.60	–2.22
Language and Literature	–2.82	+ .26	–1.97	–2.08	–2.20	–2.76	–2.10
History and Civics	–3.73	+ .07	–1.43	–1.78	–1.77	–3.64	–2.02
Music and Art	–3.35	– .59	–1.45	–1.22	–1.10	–2.27	–1.26
Reading Total	–3.78	–4.02	–5.89	–7.02	–4.51	–4.62	–3.80
Arithmetic Total	–3.54	–4.29	–5.12	–6.50	–3.56	–4.56	–3.39
Information Total	–3.04	+2.76	–2.90	–3.16	–2.43	–3.62	+ .74

The data of Table 135 agree in general with the results of the use of the educational quotients in their indication that the intelligence level of the gifted children is higher than their achievement level. There are 77 differences in the table if we omit the differences involving total scores. Of these, 73 are negative and greater than one standard deviation of such a difference. We may make a more exact comparison.

Since the educational quotient was found to be about 140, and the IQ about 150, it may be stated that the achievement level of the gifted children is 40 per cent above that expected for their chronological ages and approximately 10 per cent below that expected for their intelligence level. We find the mean of all the Stanford-Binet standard scores is 3.98, and the mean of all the achievement test standard scores is 2.47. The score 2.47 is 62 per cent of the 3.98, which is the difference between the intelligence level of unselected children and the intelligence level of gifted children, as expressed in terms of standard scores. The difference between the mean EQ and the obtained EQ is 40, which is 80 per cent of the difference between the intelligence levels of unselected children and of gifted children expressed in terms of quotients. On the basis of EQ the gifted children are achieving 80 per cent of the excess achievement which their intelligence would warrant; on the basis of standard scores 62 per cent. While the gifted children have an achievement level well above that of other children, it is nevertheless so much below their level of intelligence as to make the condition a definite challenge to both the parent and the teacher.

By use of the standard error we can give additional confirmation to the results just described. Again weighting all the tests equally we find their mean reliability coefficient to be .829. This reliability coefficient makes possible the calculation of the standard error of the difference ($\sigma_{d.\infty w}$), which is .5848 z. Hence the probable verity of the difference 1.51 z is $\frac{1.51}{.5848}$ or 3.18 $\sigma_{d.\infty w}$. Then the chances of the difference between the achievement level and the intelligence level being as small as 0 are not over .0007.

It might be asserted that these gifted children represent a highly selected group whose Stanford-Binet scores are spuriously high. That is, by the method of selection those who accidentally made low Stanford-Binet scores were rejected and those whose intelligence is actually lower than the Stanford-Binet scores indicate, secured high scores because of the less than perfect reliability of the Stanford-Binet test. The correction[1] which would apply to these scores

[1]Kelley, T. L. *Statistical Methods*, The Macmillan Co. (1923), Sec. 60, p. 214 ff.

would then be: $X_\infty = r_{11}X_1 + (1 - r_{11})\ M$, in which X_∞ is the true score, r_{11} the reliability coefficient, X_1 the obtained score, and M the mean of the obtained distribution. But when the reliability coefficient is .90 or more the correction is negligible. Hence if we assume that each gifted child is a part of a distribution of the age group, these corrections would all be too small to change our conclusions, as the reliability coefficients for the Stanford-Binet for age groups are all in the neighborhood of 90 or better. But it might be assumed that the gifted children are to be treated as separate distributions selected by means of the Stanford-Binet test. In this case the correction would be in the direction of the means of the age groups of the gifted children, and the reliability coefficients for such groups would be used. The mean mental ages of the age groups of gifted children are:

Age group	M.A.
7	11.10
8	13.02
9	14.36
10	15.57
11	16.92
12	17.62
13	18.58

We have no reliability coefficients for M.A. distributions of children. It is very possible that a group whose M.A. scores were between 13-0 and 13-11 would yield a much lower reliability coefficient than the $r = .905$ which was found for the chronological age distribution 13-0 to 13-11 with a normal distribution of IQ's. If the reliability of M.A. groups were the same as the reliability of chronological age groups, then we know the corrections would be of no significance.

But zero is the theoretical limit of a reliability coefficient. Assuming that the reliability coefficients of the M.A. groups were all as low as zero, the mental age scores would be, when corrected, as low as the means of their respective mental age groups. It would then be logical to compare the mean standard scores for the Stanford-Binet of each age group with the mean standard scores of the other tests. But it was by this comparison that we concluded that the intelli-

gence level of the gifted children is 1.51 standard scores above the achievement level.

Two facts stand out in this study: (1) that any adequate conception of the surface of the abilities of these gifted children can be gained only by the most careful scrutiny of the profile charts of individual children; (2) that the gifted children have an intelligence level which is considerably above their achievement level.

Case Studies

The following case studies are not complete pictures of the characteristics of the children studied. They do not utilize all of the data available. They are presented merely to indicate the possibilities of this method and to show certain interesting and valuable facts. The nine cases presented here are totally inadequate to represent the great variety of profiles which were found in the whole survey. More than five hundred of these profiles were drawn and studied. These are on file at the Library and with the Department of Psychology at Stanford University.

The cases given here represent a number of age groups and in part are examples of rather extreme specialization in some one ability. Wherever possible, data from parents and teachers were examined to corroborate or qualify the findings of the tests and the treatment of the scores.

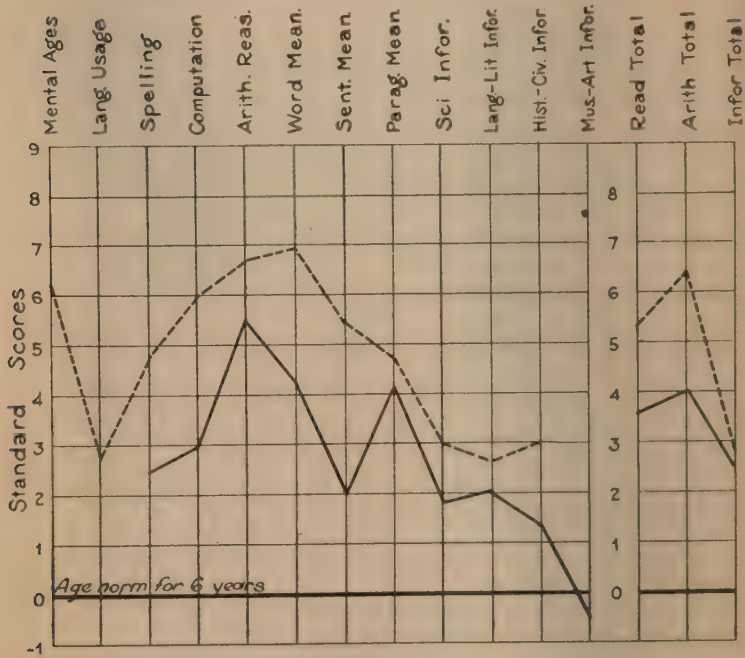
H. M. J. (Figure 16), who was 6 years, 9 months old when she scored M.A. 13 on the Stanford-Binet, thus making an IQ of 192, had the highest IQ in the 6 year group. This was just a little lower than the highest IQ found in the group of 643 children. Because of the small number of 6 year old children who can make scores on the Stanford Achievement tests, there are no valid means and standard deviations available, hence the 7 year profile chart is used. Although not 7 years old, H. M. J. is in the high third grade. Her Arithmetic Reasoning standard score is the highest of her Achievement scores, and that in Music and Art Information standard score the lowest. The difference between her Arithmetic Reasoning score and her Reading Total score is 2.06 z scores. The standard deviation of this difference ($\sigma_{d_{.\infty w}}$ from Table 132) is .46. Then this difference is 4.48 standard

deviations. H. M. J's abilities in Arithmetic Reasoning, in Word Meaning, and in Paragraph Meaning are unusual. Her Spelling and Computation are on about the same level in the middle range of her abilities. History and Civics, and Music and Art Information are low. For so young a child, with so

FIGURE 16.

PROFILE OF H. M. J.

(Girl; age, 6–9; mental age, 13–0; IQ, 192; grade, high 3.)



Solid line, obtained standard scores.
Broken line, age equivalents for mental age.

brief a school experience, this amount of unevenness is significant and suggests real innate differences.

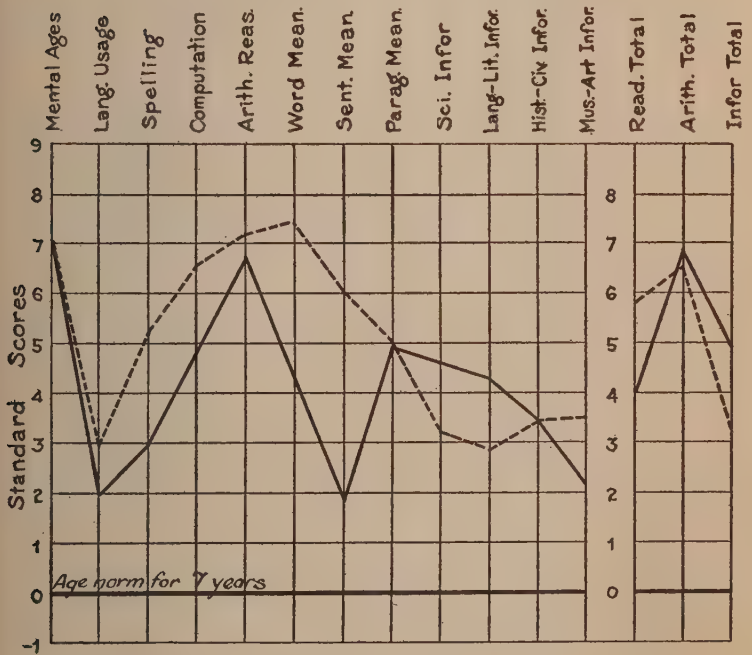
The evidence from the profile which points toward specialized abilities in Arithmetic and Reading are supported by the parents' account of the early childhood of H. M. J. She learned to read when 3 years old. Before she was 6 years

old her father states that "she carried the powers of 2 mentally up to the 20th power (1,048,576) as a Sunday afternoon pastime." He thinks she could have carried this farther but he feared the practice would tire her. She could count to 100 when 3 years old.

FIGURE 17.

PROFILE OF N. M.

(Boy; age, 7–11; mental age, 13–8; IQ, 173; grade, high 3.)



Solid line, obtained standard scores.
Broken line, age equivalents for mental age.

N. M. (Figure 17) was 7 years, 11 months old when he scored an IQ of 173, which is the highest score in the 7 year old group. Like the preceding case, N. M. is a "reasoner." His score in Arithmetic Reasoning is phenomenally high. His teacher also reports that he is superior in Arithmetic. She makes the same estimate of his reading ability, but his Arith-

metic Total score is 3.11 standard scores, or 7.58 S.D's above his Reading Total score. This difference is substantial.

N. M's teacher ranks him only a little below average in Composition. His profile indicates that his Language Usage score is very low as compared with the other scores. It is 1.89 standard errors below his Reading Total score, and 8.44 standard errors below his Arithmetic Total scores. Other low points in his profile are Spelling, Sentence Meaning, and Music and Art Information. The evenness of the Paragraph Meaning, Science Information, and Language and Literature Information is conspicuous. Spelling and Computation differ 1 *z* score or a little over 2 standard errors.

This boy, not yet 8 years old and in the third grade, shows a degree of unevenness greater than we can account for by the training he has received in his brief school experience. The parents report no home tutoring other than the usual incidental instruction. The differences in ability in this boy's case seem to be to a large extent due to native endowment.

S. M. F. (Figure 18) was 9 years and 6 months old when she made an IQ of 189, the highest for her age group. Her profile is characterized by more than usual evenness among the achievement scores and a very unusual difference between the achievement and M.A. levels. The greatest difference in her profile, that between Language and Literature Information and Paragraph Meaning, is so situated as to be rather noticeable. This difference is 2.33 standard scores or 3.88 standard deviations of this difference. On the other hand, the Language and Literature Information and the History and Civics Information are close together, the difference being but .36 standard scores. The S.D. of this difference is but .4. That is, S. M. F. shows the greatest abilities in these two information tests. With an IQ of 189, her Reading quotient is 163 and her Arithmetic quotient is 151. In terms of standard scores her achievement scores are all more than two standard deviations above her age expectancy. Hence, although her mental level is far above her achievement level, her achievement level is conspicuously above that of children of her age.

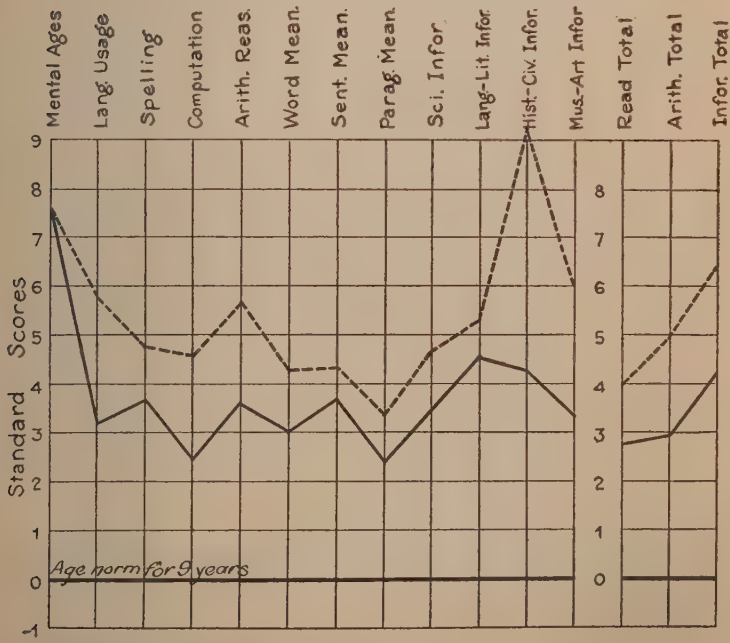
The zigzag contour of this profile suggests that the abilities measured have not developed evenly. The following differences with their standard errors confirm this assumption:

Spelling	3.73	minus	Comp.	2.53	= 1.20	$\sigma_{d.\infty w}$	.40
Language Usage	3.11	"	"	2.53	= .58	"	.57
Sentence Meaning	3.74	"	"	2.53	= 1.21	"	.44
Language and Literature Information	4.63	"	"	2.53	= 2.10	"	.62
Language and Literature Information	4.63	"	Lang. Usage	3.11	= 1.52	"	.74
Language and Literature Information	4.63	"	Par. Mean.	2.30	= 2.33	"	.60
Sentence Meaning	3.74	"	Par. Mean.	2.30	= 1.44	"	.40

FIGURE 18.

PROFILE OF S. M. F.

(Girl; age, 9–6; mental age, 17–10; IQ, 189; grade, high 5.)



Solid line, obtained standard scores.
Broken line, age equivalents for mental age.

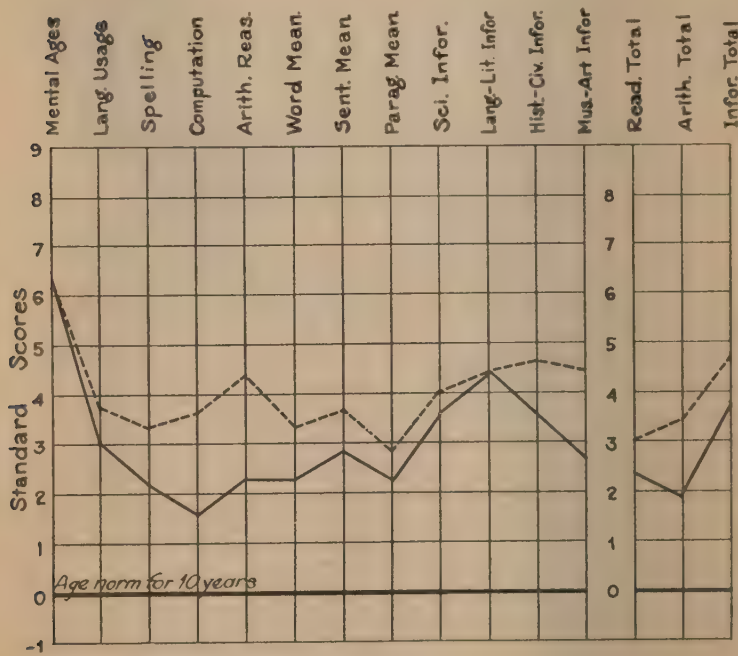
These are but a small sampling of the measurable differences shown in Figure 18.

S. D's quotient of 175 (Figure 19) is the highest IQ of the 10 year old group of gifted children. Only in the case of the score in Computation does her achievement score fall below

FIGURE 19.

PROFILE OF S. D.

(Girl; age, 10–3; mental age, 17–11; IQ, 175; grade, high 5.)



Solid line, obtained standard scores.
Broken line, age equivalents for mental age.

the level of 2 standard scores above the mean for 10 year old children. As might be expected from her high IQ, her intelligence level is markedly above her achievement level.

Her scores are quite even in the Reading tests. The Arithmetic scores, and the Spelling score are not very uneven nor do they differ very much from the Reading scores. The

largest difference in this group of scores is that between Sentence Meaning and Computation, which is 1.24 standard scores, or 2.7 times the standard deviation of this difference. This is a real difference. The scores in Language and Literature (4.41), in History and Civics (3.45), and in Science Information (3.50), stand out decisively above the level of the other achievement group (Arithmetic, Reading, and Spelling).

The parents and teacher of this child report her to be very superior in Music. The Music and Art Information Test does not reveal a superiority over the other abilities measured, although it does rate her 2.69 standard deviations above the mean for children of her age.

In addition to earning the highest IQ made by the 11 year old gifted children, A. A. (Figure 20) made the highest possible score in the Spelling Dictation test. His score in History and Civics Information is 86 out of a possible 90; in Music and Art Information it is 42 out of a possible 45; in Language Usage it is 54 out of a possible 60. In these tests it is probable that his ability has not been fully measured.

A. A's profile shows a real superiority in the ability measured by the Music and Art Information Test. This is shown by the differences found when the score on this test is compared with the Reading Total and Arithmetic Total. These differences are as follows: Music and Art score is 1.74 *z* scores or 2.95 S.D. higher than the Reading Total, and 2.27 *z* scores or 3.66 S.D. higher than Arithmetic Total. Both his mother and his teacher report A. A. as superior in musical ability and the boy himself reports that he likes music very much. He plays the 'cello.

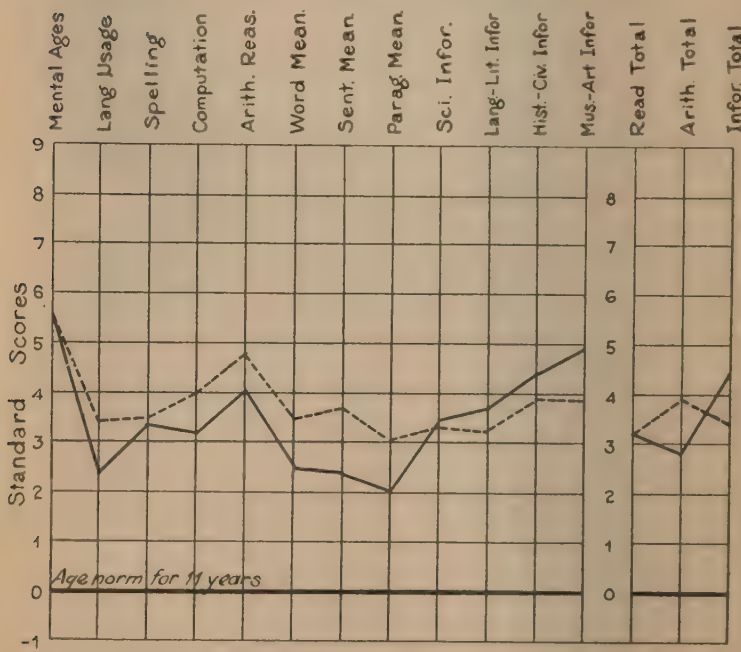
A. A's teacher also reports his mental abilities as "very even," although we find substantial unevenness in his profile. For example, in addition to those just given there is a difference between Arithmetic Reasoning and Paragraph Meaning of 1.98 *z* scores or 4.3 S.D. The probability of this difference not existing may be expressed as .00002. The differences between Arithmetic Reasoning and Language Usage, and between Word Meaning and Sentence Meaning, are also substantial. If the teacher were comparing A. A. with other children, the unevenness of his abilities might not be prominent, but in the abilities measured by these tests his abilities

are far from even. Evidence of unevenness not measured is found in his statements that he dislikes very much freehand drawing, painting, folk dancing, manual training, and mechanical drawing. His teacher rates him as below average in penmanship and manual training.

FIGURE 20.

PROFILE OF A. A.

(Girl; age, 11–11; mental age, 20–4; IQ, 171; grade, low 9.)



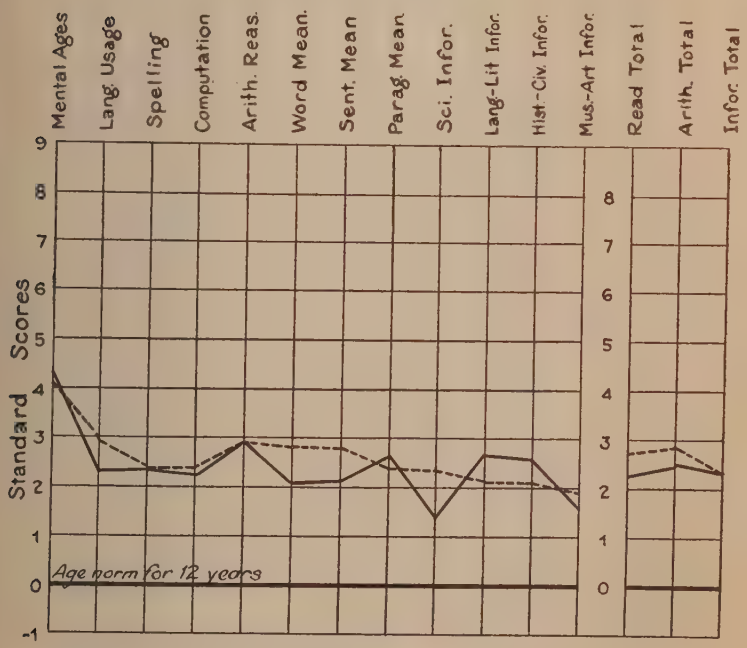
Solid line, obtained standard scores.
Broken line, age equivalents for mental age.

A. A. says he rather dislikes Spelling but finds it the easiest subject. As he made the highest possible score in this test it is probable that he has an ability in Spelling not shown by the profile chart.

G. F. (Figure 21), has the highest IQ found in the 12 year old group. Her profile is more even than those for the

younger age groups, partly because the scores are nearing the upper limits of the tests, and partly because the standard deviations are larger for these older children. On the other hand, the standard errors of the type $\sigma_{d.\infty w}$ are smaller for the 13 year olds than for the younger age groups.

FIGURE 21.
PROFILE OF G. F.
(Girl; age, 12–1; mental age, 18–11; IQ, 157; grade, low 8.)

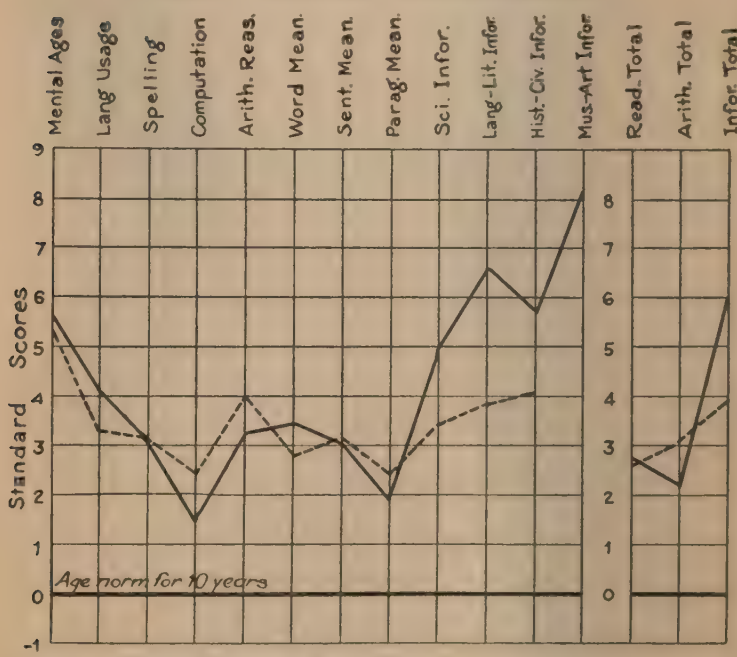


Solid line, obtained standard scores.
Broken line, age equivalents for mental age.

The difference between her Arithmetic Reasoning and Science Information scores is 1.54 z scores and 3.42 S.D. The difference between Language and Literature Information and Science Information is 1.3 z scores or 2.95 S. D. These differences are substantial and indicate a specialization in Arithmetic Reasoning and in Language and Literature In-

formation. Accompanying this superior ability in Language and Literature Information there is very superior ability in Reading, for the Paragraph Meaning score is the maximum and the Reading Total score is very near the maximum for the tests. Her teacher rates her as superior or very superior

FIGURE 22.
PROFILE OF Z. J.
(Boy; age, 10–7; mental age, 17–0; IQ, 161; grade, low 7.)



Solid line, obtained standard scores.
Broken line, age equivalents for mental age.

in all of the school subjects. With this rating, with an achievement level so high, and with an M. A. score of 18.11, one cannot but wonder why G. F. should be in the low eighth grade.

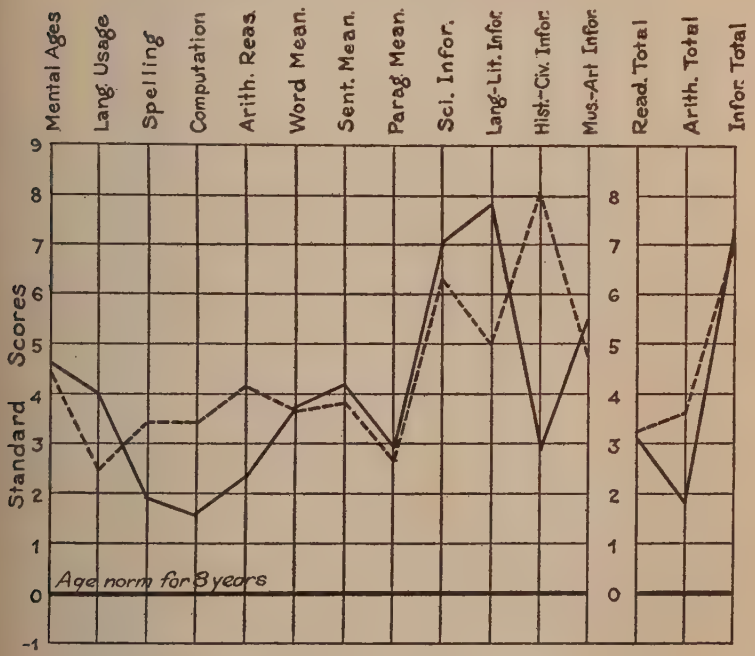
Z. J's profile (Figure 22) shows unusual specialization in the Information scores. His score in Music and Art Informa-

tion stands out above all other scores. His father plays, sings, and draws. This home influence is doubtless reflected in the high score. Z. J. finds Drawing the easiest of all his studies. He thinks he will be an architect but may decide to be an advertiser, decorator, cartoonist, magazine illustrator,

FIGURE 23.

PROFILE OF D. E. R.

(Girl; age, 8–9; mental age, 13–7; IQ, 155; grade, low 4.)



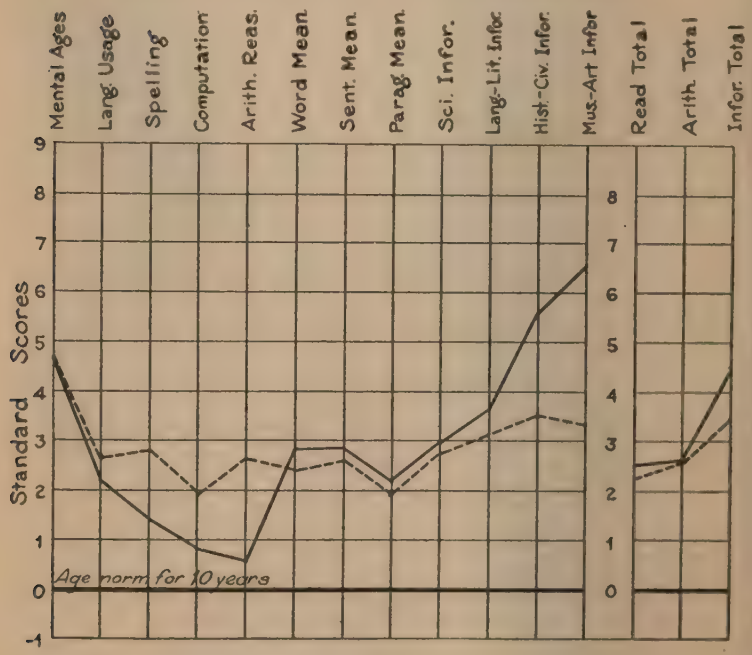
Solid line, obtained standard scores.
Broken line, age equivalents for mental age.

artist (painter of pictures), landscape artist, civil engineer, chemist, zoölogist, etc. All of which supports the evidence of this profile chart.

This little girl (Figure 23) shows prominent specialization in Science Information, and in Language and Literature Information. Her ability in Reading is well above the mean ability for her age and grade. Her Reading scores are sub-

stantially higher than her scores in Arithmetic Computation, Arithmetic Reasoning, and Spelling. There is a marked superiority of her abilities in Language Usage and Reading when they are compared with her abilities in Arithmetic. The reports of her teacher and of her parents both indicate

FIGURE 24.
PROFILE OF J. D.
(Boy; age, 10–3; mental age, 15–11; IQ, 155; grade, high 5.)



Solid line, obtained standard scores.
Broken line, age equivalents for mental age.

an ability in Arithmetic much lower than the abilities in other school subjects.

Her superior score in Science Information is doubtless due to her early and persistent interest in birds, animals, flowers, and the out-of-doors. Her interest in Literature and her Reading scores are due in part to her early training.

She learned to read before going to school. Her parents report some early instruction in Reading, and rather more than the usual amount of time spent in reading to her.

J. D. This boy, like D. E. R., has a low level of performance in Arithmetic. The Arithmetic Total score is 1.94 standard deviations below his Reading Total score. The standard error for this difference is .35, hence the difference is equal to 5.54 S.D. The difference between the Arithmetic Total and the Information Total is even greater. If all of the 105 differences were calculated for this profile they would furnish convincing evidence of the unevenness of the abilities as measured.

This profile of J. D. reveals two levels of scores. Spelling, Computation, and Arithmetic Reasoning are on one level, which is the lower level ranging from .75 z scores to 1.5 z scores. The three reading scores and the Language Usage score are between two and three standard scores above the means, making a second level. Then ranging above these levels is a series of steps ascending from Science Information, 3.02, to Language and Literature Information, 3.49, to Stanford-Binet, 4.73, to History and Civics Information, 5.53, and to Music and Art Information, 6.4.

Summary and Conclusions

The following statements are the outcome of the investigations described in the preceding pages:

1. The accumulation of improved instruments for the measurement of human traits, and the refinement of statistical procedure, make possible a new attack on the problem of the differences between traits resident in an individual.

2. Both the gifted children and the unselected children who were investigated, show such real and varied differences between their abilities in school subjects as to warrant the statement that each child must be regarded as a unique individual with specific mental mechanisms.

3. When a gifted group is compared with various sample groups of normal children, no large differences in the inequalities of their levels of achievement are discoverable. The gifted children have unevenness of the surfaces of their abilities on a very much higher level than other children.

The differences in unevenness from child to child are far more significant than the differences between the central tendencies of unevenness of any two groups.[1]

4. The best conception of the unevenness of the abilities of a child is secured by the careful examination of the array of standard scores made by that child. This examination is made much more significant if the observer uses the standard deviations of the differences between standard scores ($\sigma_{d_{s \infty w}}$).

5. The gifted children selected for case studies show several examples of definite specialization. They strongly suggest that the extension of this method by the use of other tests of other abilities will furnish invaluable assistance in vocational and educational guidance.

6. There is a significant lack of parallelism in the development of abilities to deal with school subjects. This unevenness of development in the cases of the younger children indicates differences which are too great to be accounted for by the differences in training. The development of some of the mental abilities must be greatly facilitated by innate factors.

7. The scores in Arithmetic Reasoning, Arithmetic Computation, and Spelling Dictation are conspicuous in their ability to preserve their independence from other test scores.

8. It is definitely established that the intelligence level of the gifted children is higher than the level of their achievement scores. The use of the quotients, the use of standard scores, and the use of the standard errors ($\sigma_{d_{s \sim w}}$) all agree on this point. The quotient method and the method of standard scores are in fair agreement in guaging the relation between the intelligence and the achievement levels. If the altitude of the intelligence level above the age norm is the base, the altitude of the achievement level above its age norm is found to be 62 per cent by use of the standard scores and 80 per cent by use of the educational quotients.

9. The abilities in the school subjects measured are more responsive to the influence of a general ability as measured by the Stanford-Binet Scale than they are responsive to any specialized ability measured at present.

[1]See pp. 549–550 for explanation of the slight difference that may exist between gifted and unselected children in unevenness of abilities. L. M. T.

CHAPTER XIII

SCHOLASTIC, OCCUPATIONAL, AND OTHER INTERESTS[1]

A four-page Interest Blank, 8½ x 11 inches, was filled out by the children of all the gifted groups and by control group A.[2] The first page called for ratings on the different school subjects according to preference and ease; the second page contained a list of 125 occupations to be checked so as to indicate vocational preference; the third and fourth pages were devoted to data on reading interests, collections, interest in various kinds of activities, and records of accomplishments and of offices and honors held. This chapter will summarize for the main gifted group and for the control group the data on scholastic interests, occupational interests, collections, and interests in activities.

Scholastic Interests

Ratings of the various school subjects according to preference were obtained from the gifted and control groups according to the instructions printed here in reduced type:

First, DRAW A LINE right THROUGH each subject you have NEVER STUDIED.
1. Next, put a figure 1 on the dotted line before each subject that you LIKE VERY MUCH.
2. Put a 2 before each subject that you LIKE FAIRLY WELL.
3. Put a 3 before each subject that you NEITHER LIKE NOR DISLIKE.
4. Put a 4 before each subject that you RATHER DISLIKE.
5. Put a 5 before each subject that you DISLIKE VERY MUCH.

Now, put ONE CROSS, like this, ×, before each subject that is VERY EASY FOR YOU; put TWO CROSSES, ××, before the ONE subject that is EASIEST OF ALL.

Art, etc.	Foreign Language	Practical Subjects
.....Drawing (free hand)	.....French	.....Agriculture
.....Modeling	.....German	.....Bookkeeping
.....Music (instrumental)	.....Latin	.....Cooking
.....Music (singing)	.....Spanish	.....Manual training
.....Painting, water colors, etc.		.....Mechanical drawing
	History	.....Sewing
	.....Ancient or medieval	.....Shop work,tools, etc.
	.....Civics or citizenship	.....Typewriting
	.....United States history	

[1]Written with the assistance of Jennie Benson Wyman.
[2]See pp. 177–178 for description of this control group.

ENGLISH
- Composition
- Debating or speaking
- Dramatics
- Grammar
- Literature
- Penmanship
- Reading
- Spelling

MATHEMATICS
- Algebra
- Arithmetic
- Geometry
- Trigonometry

PHYSICAL EDUCATION
- Folk dancing
- Games and sports
- Military training
- Physical training

SCIENCE
- Botany
- Chemistry
- General science
- Geography
- Nature study
- Physical geography
- Physics
- Physiology or hygiene
- Zoology

As many of the subjects had not been studied by all the children, the number at a given age who rated a subject was often small. Ages 11, 12, and 13 have therefore been combined. Ages below 11 are omitted from the following tables because of the frequency with which the younger children of the control group were unable to understand and carry out the instructions. Table 136 gives the means and the distributions of ratings by subject for the gifted and control of ages 11, 12, and 13.

The numbers were as follows:

	Boys		Girls	
	Gifted	Control	Gifted	Control
	61	50	44	40
	38	38	40	28
	11	49	15	59
Total	110	135	99	127

TABLE 136.

SCHOOL SUBJECT INTERESTS OF GIFTED AND CONTROL GROUPS

(Ages 11, 12, and 13 combined)

Subject	Ratings by Boys						Ratings by Girls					
	1	2	3	4	5	M	1	2	3	4	5	M
Drawing												
Gifted	32	38	16	10	5	2.18	39	28	11	9	1	1.92
Control	44	42	23	4	6	2.04	46	34	17	4	3	1.88
Modeling												
Gifted	17	13	8	3	1	2.00	24	20	6	0	1	1.71
Control	5	4	3	4	3	2.79	5	5	2	2	2	2.43
Music (Instrumental)												
Gifted	27	18	7	3	1	1.80	41	23	8	1	1	1.62
Control	42	13	8	2	6	1.83	43	14	3	3	1	1.52
Music (Singing)												
Gifted	18	35	28	7	8	2.50	31	33	16	3	1	1.93
Control	35	38	18	7	14	2.35	66	28	12	4	0	1.58

Subject	Ratings by Boys						Ratings by Girls					
	1	2	3	4	5	M	1	2	3	4	5	M
Painting												
Gifted	23	40	16	9	7	2.34	41	27	13	7	3	1.95
Control	35	33	14	4	2	1.92	27	26	14	2	1	1.91
Composition												
Gifted	31	25	29	7	4	2.25	44	33	13	4	0	1.75
Control	31	37	13	6	7	2.16	34	41	23	9	10	2.32
Debating												
Gifted	29	17	5	1	5	1.88	25	16	3	1	2	1.70
Control	10	10	9	6	6	2.71	8	7	12	4	6	2.81
Dramatics												
Gifted	22	10	7	4	0	1.84	39	7	1	0	0	1.19
Control	5	0	5	2	5	3.12	10	0	1	5	0	2.06
Grammar												
Gifted	26	38	20	12	6	2.35	35	34	12	8	3	2.02
Control	26	37	23	10	7	2.37	33	29	20	4	5	2.11
Literature												
Gifted	50	33	7	2	1	1.61	55	19	7	0	0	1.41
Control	27	18	16	3	3	2.06	23	24	6	4	2	1.95
Penmanship												
Gifted	7	25	31	26	19	3.23	25	23	27	10	9	2.52
Control	38	33	23	8	11	2.30	45	35	16	7	8	2.08
Reading												
Gifted	81	20	5	0	0	1.28	81	9	6	0	0	1.22
Control	65	36	13	2	3	1.67	68	29	10	6	4	1.71
Spelling												
Gifted	47	37	17	3	1	1.80	45	29	14	4	3	1.85
Control	50	37	11	5	6	1.90	71	34	7	2	3	1.56
History (Ancient or Medieval)												
Gifted	53	29	5	6	2	1.68	51	22	7	3	1	1.58
Control	25	17	5	4	1	1.83	14	6	15	3	2	2.33
Civics or Citizenship												
Gifted	22	21	20	3	1	2.10	15	22	18	1	1	2.14
Control	19	24	9	4	4	2.17	10	20	16	6	4	2.54
U. S. History												
Gifted	62	44	7	1	1	1.56	37	38	13	6	0	1.87
Control	57	32	10	3	2	1.66	35	26	17	6	12	2.31
Arithmetic												
Gifted	51	32	12	5	7	1.93	45	24	10	10	5	2.00
Control	53	34	20	11	7	2.18	57	32	13	7	5	1.87
Folk Dancing												
Gifted	2	5	7	4	8	3.42	30	13	11	2	1	1.79
Control	6	3	3	2	1	2.27	24	8	5	2	1	1.70
Games and Sports												
Gifted	80	14	3	0	0	1.21	63	20	5	1	0	1.37
Control	84	11	3	2	0	1.23	76	8	3	18	1	1.68
Physical Training												
Gifted	45	40	13	3	1	1.77	36	37	17	3	1	1.89
Control	52	26	5	2	9	1.83	45	23	8	2	2	1.66
Agriculture												
Gifted	21	19	13	5	0	2.03	10	4	4	0	0	1.67
Control	9	7	6	1	1	2.08	5	4	2	1	1	2.15

Subject	Ratings by Boys						Ratings by Girls					
	1	2	3	4	5	M	1	2	3	4	5	M
Cooking												
Gifted	—	—	—	—	—	—	54	24	4	4	1	1.55
Control	—	—	—	—	—	—	33	19	12	1	1	1.76
Manual Training												
Gifted	51	31	9	4	2	1.71	—	—	—	—	—	—
Control	58	17	2	1	0	1.31	—	—	—	—	—	—
Sewing												
Gifted	—	—	—	—	—	—	34	32	10	10	3	2.06
Control	—	—	—	—	—	—	39	26	8	7	3	1.90
Shop Work												
Gifted	37	15	4	3	2	1.66	—	—	—	—	—	—
Control	25	6	6	1	0	1.55	—	—	—	—	—	—
General Science												
Gifted	20	16	6	1	0	1.72	16	14	12	1	1	2.02
Control	23	8	2	1	2	1.36	18	12	9	0	1	1.85
Geography												
Gifted	41	41	19	4	2	1.93	38	31	16	7	0	1.91
Control	60	29	10	3	5	1.73	41	36	16	9	4	2.05
Nature Study												
Gifted	32	27	12	1	1	1.79	31	23	3	3	1	1.69
Control	28	13	7	1	2	1.75	19	12	6	3	0	1.83
Physiology and Hygiene												
Gifted	10	23	20	5	4	2.52	14	20	17	8	3	2.45
Control	17	17	7	3	6	2.28	17	13	7	5	4	2.26

Table 137 gives the ranks of the school subjects for gifted and control groups. For each sex the order shows the relative (not the absolute) degree of preference according to intelligence, the subjects at the top being relatively most liked by the gifted, those at the bottom by the control. An examination of this table will show that the subjects relatively more liked by the gifted are those demanding the largest amount of abstract thinking, and that those relatively more liked by the control are those demanding the least. However, certain subjects are found in an unexpected position. For example, arithmetic, general science, and spelling are relatively more liked by control than gifted girls. To a less extent this also holds true for grammar. Cooking and games and sports are slightly more liked by gifted girls. Turning to the boys, geography, physiology and hygiene, and general science are relatively more liked by the control, and composition slightly more. Reading and arithmetic are only slightly better liked by the gifted, while grammar, games and sports, United States history, and shop work do not differentiate between the groups.

TABLE 137.

RANKS OF SCHOOL SUBJECTS ACCORDING TO PREFERENCE

Subject	Ranks by Gifted	Ranks by Control	Difference C-G
Relatively more liked by G. boys			
Dramatics	13	27	14
Debating	14	25	11
Literature	4	15	11
Modeling	17	26	9
Little difference			
Reading	2	6	4
Ancient History	6	10	4
Arithmetic	15	19	4
U. S. History	3	5	2
Phys. Training	9	11	2
Games & Sports	1	1	0
Spelling	12	12	0
Grammar	23	24	−1
Civics	19	18	−1
Shop Work	5	4	−1
Singing	25	23	−2
Agriculture	18	16	−2
Nature Study	10	8	−2
Instru. Music	11	9	−2
Folk Dancing	24	20	−4
Composition	21	17	−4
Relatively more liked by C. boys			
General Science	8	3	−5
Physiol. & Hyg.	26	21	−5
Penmanship	27	22	−5
Man. Training	7	2	−5
Drawing	20	14	−6
Geography	16	7	−9
Painting	22	13	−9

Subject	Ranks by Gifted	Ranks by Control	Difference C-G
Relatively more liked by G. girls			
Ancient History	6	24	18
Debating	10	27	17
Dramatics	1	17	16
Modeling	11	25	14
Agriculture	8	20	12
Literature	4	15	11
Composition	12	23	11
U. S.History	15	22	7
Reading	2	7	5
Little difference			
Cooking	5	8	3
Games & Sports	3	5	2
Civics	25	26	1
Nature Study	9	9	0
Geography	17	6	−1
Grammar	22	19	−3
Relatively more liked by C. girls			
Physiol. & Hyg.	26	21	−5
Painting	20	14	−6
Drawing	18	12	−6
Instru. Music	7	1	−6
Folk Dancing	13	6	−7
Penmanship	27	18	−9
Arithmetic	21	11	−10
Sewing	24	13	−11
Spelling	14	2	−12
Phys. Training	16	4	−12
General Science	23	10	−13
Singing	19	3	−16

Table 137 yields the following rank-order correlations:

Gifted	boys	vs. control	boys,	*rho*	=.717
"	girls	" "	girls,	"	=.165
"	boys	" "	"	"	=.232
"	girls	" "	boys,	"	=.169
"	boys	" gifted	girls,	"	=.593
Control	"	" control	"	"	=.416

That is, gifted boys and control boys show fairly close agreement (.717), while gifted girls show very little agreement with either sex of the control group. On the other hand, gifted girls show considerable agreement with gifted boys (.593).

On page 261 are given the rank orders of the school subjects based on teachers' ratings on quality of school work the children are doing. These rank orders for quality of work have been correlated with the rank orders for preference given in Table 137. The correlations are as follows:

For gifted boys,	*rho* =.440
" " girls,	" =.176
" control boys,	" =.476
" " girls,	" =.545
Average	" =.409

Table 138 gives for each group the per cent of those rating a subject who rated it above 3, indicating positive liking, and the per cent who rated it below 3, indicating positive dislike. It will be seen that in the case of both gifted girls and control girls, every subject is more liked than disliked. Gifted boys, however, dislike penmanship and folk dancing more than they like them, and control boys have more dislike than liking for dramatics.

TABLE 138.

PER CENT OF RATINGS INDICATING POSITIVE LIKING AND POSITIVE DISLIKE

(Above 3 = +; below 3 = –)

Subject	Gifted Boys		Control Boys		Gifted Girls		Control Girls	
	+	–	+	–	+	–	+	–
Drawing	69.3%	14.9%	72.3%	8.4%	34.1%	2.3%	76.9%	6.7%
Modeling	71.4%	9.5%	47.4%	36.8%	86.3%	2.0%	62.5%	25.0%
Music (Instrumental)	62.5%	7.1%	77.5%	11.3%	86.5%	2.7%	89.1%	6.3%
Music (Singing)	55.2%	15.6%	65.2%	18.8%	76.2%	1.7%	85.5%	3.6%
Painting	66.3%	16.8%	77.3%	6.8%	74.7%	11.0%	75.7%	4.3%
Composition	58.3%	11.5%	72.3%	13.8%	81.7%	4.3%	64.1%	16.2%
Debating	80.7%	10.5%	48.9%	29.3%	87.2%	6.4%	40.5%	27.0%
Dramatics	74.4%	9.3%	29.4%	41.2%	97.9%	0.0%	62.5%	31.3%
Grammar	62.7%	17.6%	61.2%	16.5%	75.0%	12.0%	68.1%	9.9%
Literature	89.2%	3.2%	67.2%	9.0%	91.4%	0.0%	79.7%	10.2%
Penmanship	29.6%	41.7%	62.8%	16.8%	51.1%	20.2%	72.1%	13.5%
Reading	95.3%	0.0%	84.9%	4.2%	93.8%	0.0%	82.9%	8.5%
Spelling	80.0%	3.8%	79.8%	10.1%	77.9%	7.3%	89.7%	4.3%
History (Anc. or Med.)	86.3%	8.4%	80.8%	9.6%	86.9%	4.8%	50.0%	12.5%
Civics or Citizenship	64.2%	6.0%	71.7%	13.3%	64.9%	3.5%	53.6%	17.9%
U. S. History	92.2%	1.7%	85.6%	4.8%	79.8%	6.4%	63.5%	18.8%

Subject	Gifted Boys		Control Boys		Gifted Girls		Control Girls	
	+	−	+	−	+	−	+	−
Arithmetic	77.6%	11.2%	69.6%	14.4%	73.4%	16.0%	78.1%	10.5%
Folk Dancing	26.9%	46.2%	60.0%	20.0%	73.4%	5.3%	80.0%	7.1%
Games and Sports	96.9%	0.0%	95.0%	2.0%	93.3%	1.1%	79.2%	17.9%
Physical Training	83.3%	3.9%	83.0%	11.7%	77.7%	4.3%	85.0%	5.0%
Agriculture	69.0%	8.6%	66.7%	8.3%	77.8%	0.0%	69.2%	15.4%
Cooking	–	–	–	–	89.7%	5.7%	78.8%	3.0%
Manual Training	84.5%	6.2%	96.2%	1.3%	–	–	–	–
Sewing	–	–	–	–	74.2%	14.6%	78.3%	12.0%
Shop Work	85.2%	8.2%	81.6%	2.6%	–	–	–	–
General Science	83.7%	2.3%	86.1%	8.3%	68.2%	4.5%	75.0%	2.5%
Geography	76.6%	5.6%	83.2%	7.5%	75.0%	7.6%	72.6%	12.3%
Nature Study	80.8%	2.7%	80.4%	5.9%	88.5%	6.6%	77.5%	7.5%
Physiology and Hygiene	53.2%	14.5%	68.0%	18.0%	54.8%	17.7%	65.2%	19.6%

The above table is not as significant as it might be, for the reason that some groups tend on the whole to give higher ratings than other groups. In some respects it is more important to know, for a given group, which subjects have higher per cents of 1 and 2 ratings than the average subject *for that group,* and which have higher per cents of 5 and 6 ratings. This would tell us which subjects the group likes more than it likes the average school subject, and which it dislikes more than the average. Subjects more liked by a group than the average subject may be classed as positive (P) for that group; those disliked more, as negative (N); those both liked an average amount and disliked an average amount, indifferent (I); those both liked and disliked more than average, bipolar (B). Table 139 gives this classification of the subjects based on the above figures.

TABLE 139.

CLASSIFICATION OF THE SCHOOL SUBJECTS ACCORDING TO PREFERENCE

Subject	Gifted Boys	Control Boys	Gifted Girls	Control Girls
Drawing	N	I	I	P
Modeling	I	N	P	N
Music (Instrumental)	I	P	P	P
Music (Singing)	N	N	I	P
Painting	N	P	N	P
Composition	N	N	P	N
Debating	P	N	B	N
Dramatics	P	N	P	N

Subject	Gifted Boys	Control Boys	Gifted Girls	Control Girls
Grammar	N	N	N	I
Literature	P	I	P	P
Penmanship	N	N	N	N
Reading	P	P	P	P
Spelling	P	P	B	P
History (Anc. or Med.)	P	P	P	N
Civics or Citizenship	I	N	I	N
U. S. History	P	P	B	N
Arithmetic	B	N	N	P
Folk Dancing	N	N	I	P
Games and Sports	P	P	P	B
Physical Training	P	P	P	P
Agriculture	I	I	P	N
Cooking	–	–	P	P
Manual Training	P	P	–	–
Sewing	–	–	N	P
Shop Work	P	P	–	–
General Science	P	P	I	P
Geography	P	P	N	B
Nature Study	P	P	B	P
Physiology and Hygiene	N	N	N	N

It will be recalled that each child was asked to mark with a cross each subject that was "very easy" for him, and with two crosses the subject that was "easiest of all." In summarizing the responses it has been necessary to disregard the distinction between single and double crosses, as the number of double crosses given any one subject by our 11, 12, and 13 year old groups was too small to justify separate treatment. Table 140 gives the per cent of children of each sex and intelligence group who marked a subject with either one or two crosses.

TABLE 140.

PER CENTS MARKING EACH SUBJECT AS "EASY"

Subject	Gifted Boys	Control Boys	Gifted Girls	Control Girls
Drawing	22.8%	48.7%	28.4%	36.5%
Modeling	4.8%	21.1%	11.8%	12.5%
Music (Instrumental)	28.6%	32.4%	39.2%	46.9%
Singing	19.8%	35.7%	42.9%	47.3%
Painting	15.8%	33.0%	22.0%	35.7%
Composition	29.2%	35.1%	50.5%	30.8%

Subject	Gifted Boys	Control Boys	Gifted Girls	Control Girls
Debating	31.6%	17.1%	38.3%	24.3%
Dramatics	32.6%	23.5%	55.3%	31.3%
Grammar	29.4%	24.3%	53.3%	34.1%
Literature	31.2%	23.9%	58.0%	8.5%
Penmanship	9.3%	29.2%	28.7%	30.6%
Reading	80.2%	63.9%	77.1%	50.4%
Spelling	56.2%	50.5%	70.5%	62.4%
Ancient History	43.2%	42.3%	54.8%	30.0%
Civics or Citizenship	20.9%	30.0%	33.3%	25.0%
U. S. History	46.1%	51.9%	50.0%	26.0%
Arithmetic	48.6%	40.8%	50.0%	48.2%
Folk Dancing	11.5%	40.0%	50.9%	45.0%
Games and Sports	38.1%	57.0%	51.7%	25.5%
Physical Training	28.4%	31.9%	46.8%	28.8%
Agriculture	24.1%	33.3%	33.3%	53.8%
Cooking	—	—	57.5%	62.1%
Manual Training	26.8%	44.4%	—	—
Sewing	—	—	21.3%	53.1%
Shop Work	26.2%	13.2%	—	—
General Science	25.6%	50.0%	38.6%	45.0%
Geography	37.4%	47.7%	52.2%	22.6%
Nature Study	20.5%	45.1%	42.6%	32.5%
Physiology and Hygiene	24.2%	30.0%	33.9%	30.4%

Table 141 gives, separately for sex and intelligence, the ranks of the school subjects according to the per cent designating them as easy. The subjects at the top are those relatively easiest for the gifted; those at the bottom are relatively easiest for the control. In general, the abstract subjects are well toward the top, and the more "practical" subjects in the lower part of the lists. Surprisingly, however, shop work is rated relatively much easier by gifted than by control boys, and arithmetic somewhat easier by control than by gifted girls.

TABLE 141.

RANKS OF THE SCHOOL SUBJECTS ACCORDING TO EASE

Subject	Boys Ranks by Gifted	Boys Ranks by Control	Boys Difference C-G	Subject	Girls Ranks by Gifted	Girls Ranks by Control	Girls Difference C-G
Relatively easier for G. boys				*Relatively easier for G. girls*			
Debating	9	26	17	Literature	3	27	24
Dramatics	8	24	16	Geography	8	25	17
Literature	10	23	13	Ancient History	6	19	13
Grammar	11	22	11	Games & Sports	9	22	13
Shop Work	16	27	11	Dramatics	5	15	10
Arithmetic	3	11	8	U. S. History	13	21	8
Ancient History	5	10	5	Grammar	7	13	6
				Physical Train.	14	20	6
Little difference				Composition	11	16	5
Instru. Music	13	17	4	Debating	19	24	5
Physical Train.	14	18	4				
Spelling	2	4	2	*Little difference*			
Composition	12	14	2	Reading	1	5	4
Physiol. & Hyg.	18	19	1	Civics	21	23	2
Civics	21	20	1	Folk Dancing	10	10	0
Reading	1	1	0	Spelling	2	1	–1
Geography	7	7	0	Modeling	27	26	–1
U. S. History	4	3	–1	Cooking	4	2	–2
Modeling	27	25	–2	Nature Study	16	14	–2
Games & Sports	6	2	–4	Physiol. & Hyg.	20	18	–2
Agriculture	19	15	–4				
				Relatively easier for C. girls			
Relatively easier for C. boys				Arithmetic	12	6	–6
Penmanship	26	21	–5	Penmanship	23	17	–6
Manual Train.	15	9	–6	Singing	15	7	–8
Painting	24	16	–8	General Science	18	9	–9
Singing	23	13	–10	Instru. Music	17	8	–9
General Science	17	5	–12	Painting	25	12	–13
Folk Dancing	25	12	–13	Drawing	24	11	–13
Nature Study	22	8	–14	Agriculture	22	3	–19
Drawing	20	6	–14	Sewing	26	4	–22

Table 141 yields the following rank-order correlations with respect to ease:[1]

[1]Numerous studies have been made, chiefly in Germany, of children's interest in the different school subjects. Perhaps the most important is that of George Brandell, Das Interesse der Schulkinder in den Unterrichtsfächern; Beiheft, *Zeitschrift f. ange. Psychol.*, Leipzig, 1915, 168 pages. Others are as follows: Karl Kohn, über Beliebtheit und Unbeliebtheit von Unterrichtsfächern, *Zeitschrift f. päd. Psychol.*, 19, 296–335, 1918; F. Malsch, Das Interesse f. d. Unterrichtsfächern an höheren Knabenschulen, *Zeitschrift f. ange. Psychol.*, 22, 393–441, 1923; W. Stern, über Beliebtheit u. Unbeliebtheit der Schulfächer, *Zeitschrift f. päd. Psychol.*, 1905, 267–296. These studies allow many interesting comparisons with the material reported in the present chapter. However, as the methods which the authors used in collecting and treating their data are not identical with those here employed, any detailed comparison of results is likely to be misleading, and for this reason we have not attempted it.

Gifted	boys vs. control	boys,	*rho*	=.371
"	girls "	"	girls,	"	=.091
"	boys "	"	"	"	=.013
"	girls "	"	boys,	"	=.164
"	boys "	gifted	girls,	"	=.697
Control	boys "	control	"	"	=.262

The closest agreement (.697) is between gifted boys and gifted girls. Between gifted and control boys the correlation is only .371; between gifted and control girls it is too low to be significant (.09).

The rank orders for the preferred and easy subject (tables 139 and 141) yield the following correlations:

Gifted boys,	*rho*	=.611
Control "	"	=.638
Gifted girls,	"	=.561
Control "	"	=.555
Average,		.591

Occupational Interests

A statistical summary of the occupational interests expressed by a group of children still in the pre-high school grades can have, of course, only a suggestive value. Perhaps no other kind of interest is so likely to change. In voicing such preferences the young child is doubly handicapped; he has little understanding of himself, and his knowledge about many occupations is exceedingly vague or inaccurate. Nevertheless, even though the preferences expressed by our gifted children may express only ephemeral interests, they were deemed a necessary part of our records. They at least represent in each case a cross-section view of the child's interests, and their real value can only be appraised when the children have become men and women and have chosen their careers.

The Interest Blank called for the following information on occupational interests:

PUT ONE CROSS BEFORE EACH OCCUPATION YOU MAY POSSIBLY DECIDE TO FOLLOW. PUT TWO CROSSES BEFORE THE ONE OCCUPATION YOU ARE MOST LIKELY TO CHOOSE.

.....Section hand
.....Street laborer
.....Bootblack
.....Logger
.....Hod carrier
.....Janitor

.....Teamster
.....Deliveryman
.....Truck driver
.....Waiter or waitress
.....Cook

.....Cobbler
.....Barber
.....Butcher
.....Baker
.....Grocer

.....Soldier or sailor
.....Conductor or motorman
.....Fireman or brakeman
.....Chauffeur
.....Policeman
.....Detective

.....Plasterer
.....Tailor
.....House painter
.....Plumber
.....Carpenter
.....Stone or brick mason
.....Joiner
.....Watch repairer

.....Dressmaker
.....Milliner
.....Housewife
.....Chef
.....Florist

.....Fisherman
.....Forest ranger
.....Farmer or rancher
.....Dairyman
.....Stock breeder

.....Acrobat
.....Boxer or wrestler
.....Auto racer
.....Baseball player
.....Aviator

.....Electrician
.....Wireless operator
.....Draftsman
.....Mechanic or machinist
.....Photographer
.....Surveyor

.....Clerk
.....Mail carrier
.....Ticket or express agent
.....Auto salesman
.....Traveling salesman

.....Stenographer or typist
.....Linotypist
.....Private secretary
.....Bookkeeper or accountant
.....Nurse

.....Merchant
.....Advertiser
.....Building contractor
.....Factory or business manager
.....Banker

.....Music teacher
.....Singer
.....Musician (player)
.....Musician (composer)
.....Orchestra conductor

.....Dancer
.....Actor or actress
.....Stage manager
.....Orator
.....Lecturer

.....Decorator
.....Cartoonist
.....Magazine illustrator
.....Artist (painter of pictures)

.....Landscape artist
.....Architect
.....Sculptor

.....Library assistant
.....Librarian
.....Social worker
.....Teacher
.....School principal

.....Reporter
.....Editor
.....Story writer
.....Novelist
.....Poet
.....Play writer
.....Historian

.....Christian Science healer
.....Veterinary doctor
.....Dentist
.....Surgeon
.....Physician

.....Civil engineer
.....Mining engineer
.....Mechanical engineer
.....Electrical engineer
.....Chemical engineer

.....Army or navy officer
.....Politician
.....Congressman
.....Mayor
.....Lawyer or judge

.....Astronomer
.....Mathematician
.....Physicist
.....Chemist
.....Mineralogist

.....Botanist
.....Zoologist
.....Bacteriologist
.....Psychologist
.....College professor

.....Explorer
.....Priest
.....Preacher
.....Reformer
.....Statesman

If the occupation you would like best is not given above, write it here. . . . .
If you are a girl, do you prefer the duties of housewife to any other occupation? ...

The list of 125 occupations was increased to 164 by additions which the children themselves made. These have been classified under twelve heads, as indicated in Table 142, which gives the per cent of boys and girls in each group naming each occupation. The first four columns give the per cents for occupations the children say they are "most likely to follow"; the last four columns those they "may possibly decide to follow."

TABLE 142.

PER CENT OF GIFTED AND CONTROL GROUPS CHOOSING VARIOUS TYPES OF OCCUPATIONS

	Most likely to follow				May possibly follow			
	Boys		Girls		Boys		Girls	
Type of occupation	Gifted	Control	Gifted	Control	Gifted	Control	Gifted	Control
Agriculture, horticulture, stock-raising, dairying	3.8%	0.0%	0.2%	0.0%	8.2%	7.9%	1.7%	0.8%
Mechanical trades, building and construction and manufacturing	5.5%	13.2%	0.6%	5.4%	8.7%	13.5%	3.7%	11.1%
Transportation	5.4%	7.2%	0.0%	0.6%	3.4%	9.3%	0.0%	0.4%
Commercial	8.5%	8.1%	2.0%	1.0%	6.5%	7.5%	0.6%	1.1%
Public service	5.1%	10.8%	0.0%	0.0%	7.3%	10.1%	0.3%	0.3%
Domestic and personal service	0.5%	2.1%	22.8%	15.3%	1.1%	2.5%	10.5%	13.1%
Clerical occupations	4.7%	7.2%	5.9%	19.6%	6.2%	5.8%	6.7%	12.0%
Artistic	9.1%	4.9%	23.6%	14.0%	10.3%	7.3%	27.2%	21.8%
Semi-professional	3.8%	2.1%	4.5%	3.0%	5.2%	3.0%	6.4%	4.9%
Professional	48.3%	24.9%	37.8%	37.6%	35.1%	20.1%	40.5%	31.8%
Social work	1.2%	0.7%	1.7%	1.0%	0.9%	0.6%	1.5%	0.8%
Athletics	3.9%	11.5%	0.6%	2.4%	7.1%	12.5%	0.9%	12.5%

The gifted show greater preference for the following occupations: public service, professional (boys), artistic, semi-professional, and agriculture (slightly). The control group expresses greater preference for the following: mechanical, etc., transportation, athletic, and clerical. The groups show little difference in preference for commercial

occupations and social work. There are more first choices for domestic and personal service (including secretarial work) by the gifted, but more second choices by the control group.

Table 143 gives the mean Barr Scale ratings of first choice and second choice occupations for each group by age and sex. (See page 66 ff, for description of the Barr Scale of rating occupations according to their estimated demands upon intelligence.) As there were ordinarily several "second" choices for a given child, these were averaged to give a single Barr rating for the occupations considered as possibilities.

TABLE 143.

MEAN BARR SCALE RATINGS OF PREFERRED OCCUPATIONS

	Most likely to follow				May possibly follow			
	Boys		Girls		Boys		Girls	
Age	Gifted	Control	Gifted	Control	Gifted	Control	Gifted	Control
8	14.2	12.8	13.4	11.7	13.8	12.9	13.6	12.7
9	15.1	10.9	13.8	12.7	14.1	10.6	13.7	12.4
10	15.4	11.8	13.8	13.3	14.6	12.0	13.8	12.9
11	16.0	13.0	13.9	12.8	14.9	11.4	14.0	12.9
12	15.7	14.0	14.7	12.3	14.8	12.8	14.2	12.0
13	16.1	13.9	14.2	12.9	15.9	12.7	14.4	12.8
Average all ages	15.4	12.7	13.9	12.6	14.7	12.1	14.0	12.6
Average S.D. for all ages	2.44	—	1.82	—	1.84	—	1.12	—

Both groups display a good deal of ambition in their occupational preferences, but the average Barr rating of the occupations chosen by the gifted runs higher than that for the control by roughly 1.5 the S.D. of the former. The average gifted boy is looking to an occupation which presents about the intellectual difficulties of high school teaching, preaching, or industrial chemistry; the average control boy, to an occupation about as intellectual as the work of a nurse, chef, or landscape gardener. The occupations followed by the fathers of the gifted have an average Barr rating of 12.77, as compared with 8.8 for average adult males in these cities. In the gifted group there is less distance between the occupational ambitions of child and occupational status of father, than in the case of the control group. The occupational am-

bitions of the control group tend to be, intelligence considered, more extravagant than those of the gifted.

The only significant sex difference is that the occupational choices of gifted boys rate somewhat higher than those of gifted girls.

The total number of occupations marked by each child was tabulated by age, sex, and intelligence. As will be seen from Table 144, no significant difference was found between the gifted and control groups. Boys of both groups mark about 25 per cent more occupations than girls mark, and for both sexes and both intelligence groups the number marked at age 13 is less than in earlier years.

TABLE 144.

NUMBER OF OCCUPATIONS PREFERRED

	Average for each age			
	Boys		Girls	
Age	Gifted	Control	Gifted	Control
8	7.0	7.4	5.0	6.4
9	9.2	8.2	4.8	6.6
10	7.0	7.0	5.3	5.1
11	6.5	7.2	5.5	4.9
12	6.0	8.0	7.0	5.5
13	4.3	6.3	5.4	4.1
Average of averages	6.67	7.3	5.5	5.4

PREFERENCE FOR VARIOUS TYPES OF ACTIVITY

One item in the Interest Blank was as follows:

5. Below are several different kinds of things to do. ON THE LINE BEFORE EACH THING, PUT A FIGURE (1, 2, 3, 4, OR 5) TO SHOW HOW WELL YOU LIKE TO DO THAT KIND OF THING.

Put a 1 if you LIKE IT VERY MUCH.
Put a 2 if you LIKE IT FAIRLY WELL.
Put a 3 if you NEITHER LIKE IT NOR DISLIKE IT.
Put a 4 if you RATHER DISLIKE IT.
Put a 5 if you DISLIKE IT VERY MUCH.

.....Studying your lessons.
.....General reading (books, magazines, newspapers).
.....Practicing music, drawing, dancing, etc.
.....Playing games that require little physical exercise.
.....Playing games that require lots of exercise.
.....Playing with several other persons.
.....Playing with one other person.
.....Playing alone.

.....Going to parties, picnics, dances, club meetings, etc.
.....Using tools or working with apparatus and machinery.
.....Sewing, cooking, knitting, housework, etc.
.....Being leader in a team or club and managing other persons.

The ratings were made by the child during school hours and with no suggestions from anyone. They may fairly safely be taken to represent in each case the child's attitude at the time the blank was filled out. The ratings were distributed separately by age for the boys and girls of both gifted and control groups. As the age differences proved to be relatively small, the ages have been combined for each group. Table 145 gives the mean ratings for each type of activity. The figures are for ages 8 to 13 only, as there were no control children younger than 8 or gifted children older than 13.

TABLE 145.

MEAN PREFERENCE RATINGS ON VARIOUS ACTIVITIES BY GIFTED AND CONTROL CHILDREN

(1 is high and 5 is low)

Activity	Boys		Girls	
	Gifted	Control	Gifted	Control
Study lessons	2.34	2.26	2.31	1.99
General reading	1.31	1.77	1.21	1.75
Music, drawing, or dancing	2.84	2.81	1.67	1.72
Games requiring little physical exercise	2.18	2.07	2.15	2.09
Games requiring much physical exercise	1.50	1.72	1.49	1.68
Playing with several other persons	1.50	1.51	1.49	1.60
Playing with one other person	1.67	2.40	1.76	2.27
Playing alone	3.47	3.85	3.42	3.78
Parties, picnics, club meetings, etc.	1.96	1.91	1.43	1.50
Tools, apparatus, or machinery	1.81	1.89	2.97	3.47
Sewing, cooking, housework, etc.	4.21	4.17	2.13	1.89
Being leader in a team or club, etc.	2.12	2.20	2.21	2.37

It will be seen that the gifted children rate most of these activities higher than do the control; they seem to have a little more enthusiasm about things in general. The control rate no activity appreciably higher than the gifted rate it, but the gifted rate reading and "playing with one other person" lower than do the control. The other activities are about equally liked by the two groups. The evidence of Table 145 suggests rather convincingly that the interests of gifted children are in these respects quite normal. The typical

gifted child likes vigorous games, plays with tools and apparatus, likes the companionship of others, and shows no abnormal fondness for solitude or study. The rank orders of the activities for gifted and control boys give a correlation of .87; those for gifted and control girls, .86.

Comparing girls with boys, we find that girls' ratings tend to run a little higher than those of boys. They especially rate "practicing music, drawing, and dancing," "going to parties and picnics," and "sewing, cooking, etc.," higher than do boys. Reading and "playing with one other person" are also liked somewhat better by girls. Only one activity is rated higher by boys,—"using tools, etc."

Collections

Statements of the children. In the Interest Blank, which was filled out by both gifted and control groups, the following question was asked: *Name all the collections you have made; tell how old you were when you made the collection and tell how large it was.* Then followed space for recording eight collections. The mean number of collections made is shown in Table 146 for age, sex, and intelligence groups.

Table 146.

Number of Collections Made (Testimony of the Children)

	Gifted		Control	
Age	Boys	Girls	Boys	Girls
6	1	1	0	0
7	.75	.06	0	0
8	1.42	1.17	.48	.88
9	1.81	1.44	.38	.97
10	1.63	1.40	.5	.7
11	1.68	1.93	1.15	.8
12	1.90	1.77	1.28	1.54
13	2.00	1.13	1.3	.74
Ages combined, average for both sexes		1.51	Ages combined, average for both sexes	.87

This table is based upon total number of collections made, regardless of their nature. Table 147 shows that gifted children tend to make more collections of scientific value or interest. Collections of the following kinds were included in this category:

Birds, birds' eggs, nests, feathers, etc.
Coins and money
Flowers, grasses, leaves, etc.
Foreign articles, (Chinese bronzes, flags, ancient weapons)
Rocks, stones, minerals, pebbles, agates, sand
Shells, starfish, crabs, snails, insects of various sorts
Stamps
Electrical instruments
Different kinds of woods.

TABLE 147.

NUMBER WHO HAVE MADE COLLECTIONS OF SCIENTIFIC INTEREST OR VALUE

	Gifted		Control	
Under 7 years	Boys	Girls	Boys	Girls
Number	1	4	0	0
Average per child	0.2	0.8	0	0
Ages 7 to 9 years				
Number	61	113	16	16
Average per child	0.55	0.75	0.1	0.2
Ages 10 to 13 years				
Number	130	230	76	105
Average per child	0.68	1.11	0.30	0.57
Ages combined				
Number	152	300	58	94
Average per child	0.62	0.96	0.30	0.48
Average, sexes combined	0.85		0.41	

The above tables show that 1.74 times as many gifted as control children have made collections of some kind, but that 2.07 times as many gifted as control have made collections of scientific nature.

Statements of the parents. In the Home Blank parents were asked to name the collections the child had made, to indicate from what age to what age it was in progress, and to state whether it was "large, medium, or small." Data for gifted only are available from the Home Blank. Replies were received for 603 cases of the main group; 330 boys and

273 girls. Failure to reply was counted as meaning that no collection had been made. The results are shown in Table 148.

TABLE 148.

COLLECTIONS NAMED BY PARENTS, AND AGE AT WHICH THEY WERE BEGUN

	Gifted Boys					Gifted Girls				
	Below 7	7–9	10–13	Total	Per cent	Below 7	7–9	10–13	Total	Per cent
Stamps	13	61	25	105	31.8%	3	9	6	21	7.7%
Coins	3	3	4	12	3.6%	0	1	0	2	0.7%
Pictures	9	8	9	29	8.8%	6	5	7	23	8.4%
Shells	11	9	4	25	7.6%	6	4	2	16	5.9%
Insects	10	10	7	28	8.5%	3	4	2	12	4.4%
Stones or minerals	11	5	5	25	7.6%	9	4	2	18	6.6%
Flowers	4	3	2	10	3.0%	9	9	5	25	9.2%
Nests and eggs	4	0	1	6	1.8%	0	2	0	3	1.1%
Electrical apparatus	0	1	2	4	1.2%	0	0	0	0	0
Dolls	1	0	0	0	0.3%	11	1	2	31	11.4%
Labels and coupons	6	6	2	18	5.5%	0	2	0	3	1.1%
"Samples"	1	2	0	3	0.9%	7	7	2	17	6.2%
Marbles	9	7	0	17	5.2%	0	0	0	0	0
Postcards	5	4	1	12	3.6%	3	2	0	5	1.8%
Books	13	1	2	16	4.8%	6	3	0	15	5.5%
Curios	0	2	0	3	0.9%	0	0	1	1	0.3%
Streetcar transfers	2	2	1	5	1.5%	0	0	0	0	0
Time tables	0	3	0	3	0.9%	0	0	0	0	0
Miscellaneous	16	12	5	40	12.1%	8	7	7	29	10.6%
Total collections	124	148	82	362	109.7%	76	68	43	221	80.9%

Note. "Total" columns include a few cases for whom age was not stated and who therefore do not appear in the age columns. The "miscellaneous" category includes maps, "funny papers," arrowheads, beads, soil, baseball records, buttons, and other collections receiving very infrequent mention.

Attention is called to the fact that the ages of the 603 subjects entering into Table 148 ranged from 3 to 13 years at the time the data were collected. Had all the subjects been 12 years old, say, the figures in the total columns would have been much higher, as it has been found that the collecting interest does not normally reach its maximum before 10 or 11. Even so, the boys have averaged more than one collection each.

The sex differences are much as might be expected. Boys more often than girls collect stamps, coins, marbles, labels, coupons, shells, insects, etc. Girls more often than boys collect flowers, dolls, and "samples."

The following numbers of gifted children, according to the statements of parents, have made more than one collection:

	Boys		Girls	
	N		N	
Total who have made collections	188	57%	116	42.5%
Have made two or more	92	27.9%	59	21.6%
" " three " "	46	13.9%	30	11.0%
" " four " "	22	6.7%	10	3.6%
" " five " "	10	3.0%	5	1.8%

In general, the statements of the parents agree fairly well with those of the children themselves. Boys, however, report a good many more collections than parents report for them. The parent is probably more likely to forget a given collection or to consider it too trivial to mention.

Summary

1. With certain exceptions, gifted children are more interested than unselected children in school subjects which are abstract, and less interested in the "practical" subjects. Their interest is relatively much stronger, for example, in such subjects as literature and dramatics, and much weaker in penmanship, manual training, sewing, etc. However, the gifted and control children express about the same degree of preference for games and sports; also for grammar.

2. The subject preferences of gifted boys resemble those of control boys far more than the preferences of gifted girls resemble those of control girls. The preferences of gifted boys and gifted girls are more alike than those of control boys and control girls.

3. The average correlation of the gifted children's preferences, and the teachers' estimates of the quality of the children's work in the different subjects, is .41.

4. For each sex and intelligence group, each school subject has been compared with the average of all the subjects with respect to the number of 1 or 2 and 3 or 4 ratings it secured. This made possible a classification of the school

subjects, for each sex and intelligence group, as "positive," "negative," "indifferent," or "bipolar."

5. Subjects that are positive both with gifted boys and with gifted girls are dramatics, literature, reading, history, games and sports, and physical training; subjects that are negative with both gifted groups are painting, grammar, penmanship, and physiology and hygiene. Civics or citizenship is the only subject that is indifferent to both groups. Bipolarity is rare with both gifted and control groups.

6. The gifted, far oftener than the control, rate as "very easy" such subjects as literature, grammar, debating, and ancient history; the control, far oftener than the gifted, such subjects as sewing, drawing, painting, general science, singing, folk dancing, penmanship, etc. However, shop work is ranked much higher for ease by gifted boys than by control boys, and arithmetic somewhat higher by control girls than by gifted girls.

7. Gifted girls show a considerable resemblance to gifted boys in respect to subjects found easy (.70), but no significant resemblance to control girls (.09). The sex differences are much greater in the control than in the gifted group.

8. The average correlation between preference and ease is .59.

9. The occupations preferred by the gifted rate higher on the Barr Scale than those preferred by the control, by about 1.5 the S.D. of the latter. However, there is less distance between the mean occupational rating of parents and children in the case of the gifted than in the case of the control group.

10. Of a variegated list of twelve kinds of activities rated by gifted and control groups, nearly all were rated higher by the gifted. Gifted children have more enthusiasms than average children, and their interests appear to be in general no less wholesome.

11. One and three-quarters times as many gifted as control children have made collections, and more than twice as many have made collections of scientific nature.

CHAPTER XIV

PLAY INTERESTS, KNOWLEDGE, AND PRACTICE[1]

Our data on play fall into two groups: (1) results of a questionnaire-test of interest in and knowledge of plays, games, and amusements; (2) replies to certain questions in the supplementary Home Blank and School Blank relating to play and to associations with other children. On most points comparative data were secured for a control group, as it was one of the main purposes of this section of the study to determine to what extent and in what respects the play life of gifted children deviates from the normal. The belief is generally entertained that the deviation is considerable, although no statistical evidence bearing on the question has ever been presented. The importance of the problem was thought to justify a considerable expenditure of time and effort in connection with the present investigation.

Nature of the Test on Plays, Games, and Amusements

The purpose of this test was to secure more accurate information about a child's play practice, play interest, and play knowledge than could be secured by ordinary questioning. Play knowledge, of course, readily lends itself to measurement by the usual type of information test, but reliable data on play practice and play interests are much more difcult to secure. There are several possible methods of approach, and it is to be regretted that there was not time for a comparative try-out of a number of the most promising. Instead, it was necessary to arrange a method for immediate use with but little of the preliminary experimental work which is so necessary for thoroughly satisfactory results in the field of test making.

The test was prepared in August and September, 1921, by the writer, assisted by Mr. Ruch, Miss Marshall, and Miss Goodenough. First, the most important statistical studies

[1]Written with the assistance of Helen Marshall and Florence L. Goodenough.

of children's play activities were reviewed in order to select those upon which to base questions. Children in the Palo Alto schools were questioned as to the games they played, and numerous adults prepared lists of well-remembered games. Since it was not possible to use for this purpose more than a small fraction of the games which children play, the aim was to make a selection which would give a fair sampling of the most generally known games of all the leading types. Other considerations were: (1) to avoid, so far as possible, games which are known by many different names; and (2) to take account of sex and age differences in such a way that the test would be equally valid for boys and girls and over a wide range of ages. Local and seasonal characters also had to be taken into account. Such studies as those of Croswell[1] and McGhee[2] afforded valuable data on the familiarity of various games. Types of games to be considered included such categories as the quiet and the active, the social and the solitary, the competitive and the non-competitive, the intellectual and the non-intellectual, etc. Finally a provisional list of about 150 games, plays, and amusements was drawn up and arranged under the following three categories:

(1) Games which are in most cases fairly active and are usually or frequently performed alone. We may call this the *active-solitary* class. Examples are spinning tops, riding a bicycle, rolling hoops, fishing, and using tools.

(2) Games which are social and usually but not always competitive. We may call this the *social-active* class. Examples are: playing tag, hide and seek, follow the leader, shinny, baseball, etc.

(3) Games which are *mildly social but relatively quiet*, making less demand upon physical strength and skill than upon the powers of imagination or logical thought, such as "playing" school, dominoes, cards, charades, checkers, etc.

The provisional list was submitted for criticism to a number of individuals, was then reduced to 120, and was then tried out on about a hundred children of grades four, six,

[1]T. R. Croswell: Amusements of Two Thousand Worcester School Children. *Pedagogical Seminary*, Vol. 6, pp. 314–371.

[2]Z. McGhee: A Study in the Play Life of Some South Carolina Children. *Pedagogical Seminary*, Vol. 7, pp. 459–478.

and eight. On the basis of the data so collected the list was reduced to 90. For use in the test the plays were listed in three columns corresponding to the types *active-solitary, active-social,* and *social-quiet.* The words in each column are so arranged that there is an age progression from the top to the bottom, those near the top referring to activities which appeal to young children and those near the bottom to the older. Although the order was based upon subjective judgments and is far from accurate, it was borne out in a general way by the data later collected from unselected children.

The entire test was made up in an eight-page booklet, 8½ x 11, containing seven exercises. Three of these were devoted to the above-mentioned 90 games and amusements. The fourth called for testimony regarding experience and skills, and the last three constituted a test of play information. The material is reproduced in the following pages:

EXERCISE 1. (INSTRUCTIONS)

First, put ONE CROSS, ×, on the line before each thing you HAVE EVER DONE OR PLAYED.
Next, put TWO CROSSES, ××, before each thing you CAN DO OR PLAY VERY WELL.

BEGIN HERE.

....Roll hoops
....Play jackstones
....Spin tops
....Play jackstraws
....Walk on stilts

....Fly kites
....Play with bow and arrow
....Coast or toboggan
....Ride bicycle
....Skate

....Ski
....Hike
....Do garden work
....Dance
....Shoot

....Fish
....Swim
....Ride horseback
....Row a boat
....Hunt

....Do plain sewing
....Cook a meal
....Knit, crochet or do fancy-work
....Use tools
....Work with machinery

....Play tag
....Ring around the rosy
....London Bridge
....Farmer in the dell
....In and out the window

....Hide and seek
....Hopscotch
....Drop the handkerchief
....Blindfold
....Postoffice

....Cat and mouse
....Red Rover
....Puss in the corner
....Pom-pom pull-away
....Blackman

....Marbles
....Duck on rock
....Follow the leader
....Anty over
....Dare base or prisoner's base

....Snap the whip
....Tug of war
....Roly poly
....Jump the rope
....Leapfrog

....Fox and hounds
....Fox and geese
....Shinny
....Croquet
....Bowling

....Wrestling
....Baseball
....Racing or jumping
....Handball
....Soccer

....Boxing
....Tennis
....Volleyball
....Basketball
....Football

....Play with dolls
....Play "dress up"
....Play house
....Play store
....Play school

....Simon says thumbs up
....Play church
....Dominoes
....Crokinole
....Parchesi

....Tiddledy-winks
....Backgammon
....Authors
....Snap
....Guessing games

....Cards
....History cards
....Geography cards
....Charades
....Anagrams or word building

....Solve puzzles
....Checkers
....Chess
....Pool
....Billiards

EXERCISE 2. (INSTRUCTIONS)

Put ONE CROSS before each thing you LIKE TO DO OR PLAY.
Put TWO CROSSES before each thing you LIKE VERY WELL.
(The word-lists were repeated.)

EXERCISE 3. (INSTRUCTIONS)

Put ONE CROSS before each thing you do or play ONCE OR TWICE A MONTH.
Put TWO CROSSES before each thing you do or play ONCE OR TWICE A WEEK.
Put THREE CROSSES before each thing you do or play NEARLY EVERY DAY.
(The word-lists were again repeated.)

EXERCISE 4

Read each question and draw a line under the right answer.

1. Did you ever catch a fish? YES NO
2. Did you ever shoot any game? YES NO
3. Did you ever make a trap? YES NO
4. Have you ever made a bow and arrow? YES NO
5. Have you ever made a kite? YES NO

6. Have you ever set up an electrical apparatus? YES NO
7. Did you ever make a water wheel? YES NO
8. Have you ever made a canoe or boat that one could ride in? YES NO
9. Can you row a boat? YES NO
10. Have you ever learned the wireless code? YES NO

11. Can you stand on your head? YES NO
12. Have you ever climbed a tree? YES NO
13. Did you ever swim 100 feet? YES NO
14. Can you dive? YES NO
15. Can you chin yourself? (Chin a pole) YES NO

16. Can you walk on you hands? YES NO
17. Can you turn a handspring? YES NO
18. Are you a Boy Scout? YES NO
19. Are you a first-class Boy Scout? YES NO
20. Are you a Bluebird? YES No

21. Are you a Campfire Girl? YES NO
22. Are you a Girls' Reserve? YES NO
23. Are you a Girl Scout? YES NO
24. Can you read the time from a sundial? YES NO
25. Have you ever set up a tent? YES NO

26. Have you ever hiked eight miles a day? YES NO
27. Have you ever cooked a meal? YES NO
28. Have you ever made a dress that was good enough to wear? YES NO
29. Have you ever had a paper route or sold papers? YES NO
30. Have you ever milked a cow? YES NO

31. Have you ever hitched up a horse? YES NO
32. Have you ever driven a horse? YES NO
33. Have you ever driven a tractor? YES NO
34. Have you ever been elected to any office or special honor? YES NO
35. Have you ever been captain of an athletic team? YES NO

36. Do you belong to a football team? YES NO
37. Do you belong to a baseball team? YES NO
38. Are you a member of a debating team? YES NO
39. Do you belong to a hiking club? YES NO
40. Do you belong to a sewing club? YES NO

41. Do you belong to a track team? YES NO
42. Do you belong to a gardening or stock-raising club? YES NO
43. Do you belong to any kind of musical or dramatic club? YES NO
44. Do you belong to any kind of church society or church club? YES NO
45. Have you ever taken part in a play? YES NO

Most of the questions in Exercise 4 relate to activities of the kind which normal, healthy-minded boys or girls are likely, under favorable circumstances, to have experience with whether they are very intelligent or not. If gifted children are typically bookish, non-active, and non-social, they should be expected to make a low score on this test. The boy who scores high on it would be, presumably, the type one often hears described as "real boy,"—healthy-minded, active, and socially adaptable. It is of course not assumed that the test is an accurate measure of these traits, but it was thought that it would at least yield data of suggestive value when a large gifted group was compared with a large control group.

Exercises 5, 6, and 7

These were all of the ordinary type of information test with alternative response words, the correct word in each sentence to be underlined. The first series (19 items) is designed to test chiefly knowledge regarding the *solitary-active* plays listed under exercises 1, 2, and 3; the second series (82 items) is a knowledge test regarding *social-active* plays; the third series (22 items) is a test of knowledge regarding the *semi-social-quiet* plays. In all there were 123 items. One purpose of exercises 5, 6, and 7 was to serve as a check upon the accuracy of responses in exercises 1, 2, and 3.

EXERCISES 5, 6, AND 7

Series 1.

1. A floor for skating is called a GRIDIRON LINKS RINK.
2. You pick up jackstraws with a MAGNET HOOK FINGERS.
3. Stirrups are used in HOCKEY SWIMMING RIDING.
4. A good wood for making bows to shoot arrows is CEDAR HICKORY WILLOW.
5. "Dog fashion" is a term used in DIVING ROWING SWIMMING.
6. Darts are most often made from SHINGLES TIN TWIGS.
7. Skis are popular in AUSTRALIA BRAZIL CANADA.
8. A quiver is a case for carrying ARROWS CARTRIDGES PISTOLS.
9. A toboggan is a kind of FISHING TACKLE GUN SLED.
10. A brand of motorcycle is the BUICK INDIAN RANGER.
11. The Mead Bicycle Co. manufacture the COLUMBIA CRUSADER HARLEY-DAVIDSON.
12. A much-prized game fish is the CARP SARDINE TROUT.
13. A reel is used in ATHLETICS FISHING HUNTING.
14. Canvasbacks are a kind of CANOE GAME-BIRD TENT.
15. A pommel is a part of a BRIDLE GUN SADDLE.
16. Decoys are used in DIVING HUNTING POLO.
17. "Blue rocks" are used in COASTING FISHING SHOOTING.
18. The "jack-knife" is a kind of DANCE DIVE RACE.
19. Trolling is a term used in FISHING GOLF HUNTING.

Series 2.

1. A singing game is FARMER-IN-THE-DELL I-SPY POISON.
2. A game often played in the school room is CAT-AND-MOUSE CROQUET BLACKMAN.
3. You must dodge quickly in GOING-TO-JERUSALEM TAG THREE-DEEP.
4. One of the players is blindfolded in BLACKMAN HOPSCOTCH HIDE-AND-SEEK.
5. The word "lag" is used in playing CROKINOLE MARBLES SHINNY.

6. A game played in the snow is FOX-AND-GEESE JACKSTRAWS POTATO-RACE.
7. In croquet we use MALLETS NETS RACQUETS.
8. An example of a hiding game is DARE-BASE RED ROVER RUN-SHEEP-RUN.
9. A game of "dares" is ANTY-OVER FOLLOW-THE-LEADER TAG.
10. One must run fast in playing CHEESE-IT POSTOFFICE THREE-DEEP.

11. The players form in a ring in BEAR-IN-THE-PIT BLACK-TOM ROLY-POLY.
12. Three-old-cat is most like BASEBALL BOWLING SHINNY.
13. A kissing game is FRUIT-BASKET POSTOFFICE RING-AROUND-THE-ROSY.
14. The Boy Scouts' motto is "BE HELPFUL" "BE PREPARED" "BE TRUTHFUL."
15. One of the "red" honors in scouting is BIRD-NAMING HEROISM TRAILING.

16. In the Morse code one dot is the letter A M E.
17. The second law of the Campfire Girls is "BE HONEST" "BE HAPPY" "GIVE SERVICE."
18. A magazine of the Campfire Girls is "THE CLUB WORKER" "THE RALLY" "WOHELO."
19. The number of players on a baseball team is 9 11 13.
20. The number of balls needed to "walk" a player is 3 4 5.

21. A drop kick scores 1 2 3.
22. The number of players on a basketball team is 5 7 9.
23. The record pole vault is about 11 FEET 13 FEET 15 FEET.
24. Football is played on COURTS GRIDIRONS LINKS.
25. The fastest runner can go a hundred yards in 8:3 9:3 10:3.

26. Ty Cobb is a BOXER PLAYER WRESTLER.
27. The Brooklyn Nationals are called the GIANTS INDIANS SUPERBAS.
28. De Palma is noted for AVIATION MOTOR-RACING YACHT-RACING.
29. The score in tennis is tied at DEUCE LOVE-30 VANTAGE-IN.
30. A dance that goes with jazz music is the FOX-TROT TWO-STEP WALTZ.

31. The game of quoits is most like BOWLING HORSESHOES SOCCER.
32. Hockey is sometimes played on ICE STILTS WATER.
33. Billiards is played on a FLOOR LAWN TABLE.
34. Roly-poly is played with a MALLET NET RUBBER BALL.
35. Billiards is played with CARDS CUES DICE.

36. Caddies are used in EUCHRE GOLF VOLLEY-BALL.
37. The players form in a line in PASS-BALL SLAP-JACK TAG.
38. Pucks are used in ARCHERY HOCKEY TENNIS.
39. "Throwing up the sponge" is a term from BOXING HORSE-RACING WRESTLING.
40. In Derby races the horses HURDLE PACE TROT.

41. One must run fast in playing JACKSTONES TIN-TIN WOOD-TAG.
42. "Migs" are used in BASEBALL MARBLES MUMBLETY-PEG.
43. The players form in a ring in BLACK TOM OLD WITCH LONDON BRIDGE.
44. The players form in a ring in DROP-THE-HANDKERCHIEF FOX-AND-GERSE TUG-OF-WAR
45. A singing game is FOLLOW-THE-LEADER LONDON BRIDGE POISON.

46. A game where you look for something hidden is I-SPY OLD WITCH ROLY-POLY.
47. A game requiring chairs is FLYING DUTCHMAN GOING-TO-JERUSALEM LONDON BRIDGE.
48. Wickets are used in playing CROQUET HOCKEY SOCCER.
49. Prisoner's base is most like ANTY-OVER POM-POM-PULL-AWAY TENNIS.
50. You must throw straight in DUCK-ON-ROCK LONDON BRIDGE RED ROVER.
51. Shinny is played with BATS CLUBS RACQUETS.
52. A game with forfeits is DARE-BASE FOLLOW-THE-LEADER THREE-DEEP.

Series 2 (continued).

53. The players form a ring in playing BLACKMAN THREE-DEEP TUG-OF-WAR.
54. A game in which you must not smile is FRUIT-BASKET OLD-WITCH TIN-TIN.
55. One of the players is blindfolded in KEEP-MOVING RUTH-AND-JACOB TUG-OF-WAR.
56. An example of a counting game is BUZ CRAMBO TURN-ABOUT.
57. The leader of a Boy Scout troop is called the ADJUTANT CORPORAL SCOUTMASTER.
58. A Boy Scout is not expected to CARRY MATCHES EAT CANDY SMOKE.
59. A Boy Scout prides himself most on his FIGHTING HONOR KNOWLEDGE.
60. The leader of Campfire Girls is called the CAMP-MISTRESS GUARDIAN TORCH-BEARER.
61. The first law of the Campfire Girls is "BE HAPPY" "BE HONEST" "SEEK BEAUTY"
62. The second degree of a Campfire Girl is FIRE-MAKER GUARDIAN TORCH-BEARER.
63. The quarterback is a player in BASEBALL BASKETBALL FOOTBALL.
64. The number of strikes needed to "fan" a player is 3 4 5.
65. The regular number of innings in baseball is 9 1 13.
66. The number of players on a football team is 7 9 11.
67. A touchdown scores 3 5 6.
68. The mile record for running is nearest 4 MINUTES 5 MINUTES 6 MINUTES.
69. The record for the running broad jump is nearest 17 FEET 20 FEET 24 FEET.
70. Dribble is a term from BASEBALL BASKETBALL HOCKEY.
71. The Chicago Nationals are called CARDINALS CUBS WHITE SOX.
72. A famous authority on card games was BOYLE WALTER CAMP HOYLE.
73. Barney Oldfield is noted for AVIATION MOTOR-RACING YACHT-RACING.
74. Hurdles are used in GOLF POLO RACES.
75. Soccer is most like FOOTBALL HANDBALL TENNIS.
76. An indoor game is SOCCER TENPINS VOLLEY-BALL.
77. Quoits are played with KNIVES MARBLES RINGS.
78. Cockswain is a term from AVIATION HORSEMANSHIP ROWING.
79. Spare is a term used in BILLIARDS BOWLING POOL.
80. Putters are a kind of CLUBS DOGS PIGEONS.
81. Horses are used in HOCKEY LACROSSE POLO.
82. Tenpins is a kind of BOWLING BILLIARDS HOCKEY.

Series 3.

1. A game in which you have to add quickly is DOMINOES FRUIT-BASKET OLD WITCH.
2. The "king row" is used in CHECKERS CROQUET DOMINOES.
3. Snap is played with CARDS DICE MALLETS.
4. The joker is used in CARDS CHECKERS TENNIS.
5. A good parlor game is AUTHORS POTATO RACE BLACKMAN.
6. The ace is used in CARDS CHECKERS TENNIS.
7. The player snaps a small, flat disk in BACKGAMMON CROKINOLE PARCHESI.
8. "Trumps" is a term used in CARDS CROKINOLE POOL.
9. Parchesi is played with CARDS DICE DOMINOES.
10. Whist is played with BALLS CARDS PINS.
11. Charades is a GAME OF CHANCE GUESSING GAME KISSING GAME.
12. "HEARTS" is played with CARDS DICE DOMINOES.
13. A game in which you make up words is ANAGRAMS BUZ CRAMBO.
14. Cards dealt to center of table are called ROYAL FLUSH SLIPPERY ANN THE WIDOW.
15. Tiddledy-winks is most like BACKGAMMON CROKINOLE PARCHESI.
16. Checkmate is a term used in CHECKERS CHESS DOMINOES.
17. The number of cards in a deck is 48 52 64.
18. Pawns are used in CHECKERS CHESS CROKINOLE.
19. The highest number of flinch cards is 10 15 25.
20. The game of checkers is most like CHESS DOMINOES WHIST.
21. Backgammon is played with CARDS CLUBS DICE.
22. The number of squares on a chess board is 36 48 64.

The test was given to children in groups of 20 to 50. The rule for timing was to allow as nearly as possible all the children to complete each exercise, and in no case to proceed to another until at least 90 per cent were through with the preceding one. Only a few children failed to complete all the tasks. As the test presupposed considerable literacy it was not given to subjects below the third school grade. Even for the third and fourth grades it is rather difficult reading.

Groups Tested

In all about 1,200 gifted children were given the test. Of the 643 children of the main gifted group, 554 were tested. In addition, a control group was tested consisting of 474 unselected children of grades 3 to 9 in Sunnyvale, Mountain View, and San Jose, California. The first two cities have a population of less than 5,000, while San Jose has about 40,000. The schools chosen were known to be about average with respect to the intelligence and social status of the children. This group will be designated Control Group B.

This chapter will be devoted entirely to the results for the main gifted group and for the control group.

Table 149 gives the distribution of control and gifted groups by age and sex. It should be noted that the control group averages considerably older than the gifted group, a fact which needs to be taken into account in certain comparisons made further on.

Table 149.

Subjects Given Play Test

Age	6 and 7	8	9	10	11	12	13	14	15–17	Total
Control boys	—	9	19	30	32	29	42	34	30	225
Control girls	—	21	27	23	35	25	46	48	24	249
Total, control	—	30	46	53	67	54	88	82	54	474
Gifted boys	17	41	48	71	68	40	18	—	—	303
Gifted girls	20	32	43	46	51	42	17	—	—	251
Total, gifted	37	73	91	117	119	82	35	—	—	554

Derivation of "Preference Indices" for the 90 Activities

It will be recalled that exercises 1, 2, and 3 deal, respectively, with knowledge of, interest in, and time devoted to the 90 different activities. The responses on these three exercises were tabulated and summarized by age and sex for

the gifted and control groups. The original intention had been to work out age and sex tendencies for each of the three exercises, but this was not found to be feasible. After considerable experimentation it was decided to combine the results of the three exercises for a single rating, as they are supplementary rather than independent parts of the test. For example, with respect to play knowledge, one might have supposed that the extent of familiarity with the activities would be definitely affected by maturity; that the younger child would report but few plays as known, and that older children would add more and more. This was not the case. Instead of increasing with age, the plays marked as known tend to remain of about the same number, but they change their character almost entirely. Thus, the younger children report knowledge of such activities as rolling hoops, playing London Bridge, playing with dolls, playing house and store, etc., while older children mark these plays very infrequently. Instead, they report activities common to older children, such as working with tools, playing baseball, tennis, authors, etc. This omission on the part of the older children robs Exercise 1 (report of play knowledge) of much of its significance. The children have tended to limit this part of their report to the same plays and activities that they mark under play interest and play practice (exercises 2 and 3). The result is that Exercise 1 has little statistical value in its present form. It is probable, however, that it has a certain value as a *practice exercise*, introducing the subject to the method of rating, and acquainting him with the list of activities. Accordingly, Exercise 1 was disregarded entirely in scoring, and the reports on exercises 2 and 3 (play interest and play practice) were combined on the assumption that the composite score on the two exercises would give a better index of play preference than could be derived from either exercise taken by itself.

Various methods of scoring exercises 2 and 3 were considered. The method finally adopted was as follows: a play marked with one cross was scored 1; one marked with two crosses, 2; and (in Exercise 3) one marked with three crosses, 4. This weighting was based upon the relative frequency of responses by one cross, two crosses, and three crosses. The end to be attained was a preference rating for

each of the 90 activities. First, the responses (single, double, and triple crosses) given by each subject in exercises 2 and 3 were transmuted into point scores, by the weightings given above, and these were tabulated, separately by activity, for all the children of a given group, age and sex (e. g., 10 year old gifted boys). Next, the total of the numerical scores received by a given activity from a given age and sex group was found and divided by the number of children in the group, to give a preference score of that activity for that group. The method may be illustrated by the use of the following hypothetical responses of five children (A, B, C, D, E) for five activities.

	Exercise 2. Play Interest Child					Exercise 3. Play Practice Child					Total Score for the Five Subjects	Total Score ÷ 5 = Preference Index of Activity
ivity	A	B	C	D	E	A	B	C	D	E		
the whip	x		x	xx	x			xx	xxx	xx	13	2.6
f war	xx	x				x	xx				6	1.2
poly		xx					x		x		4	0.8
the rope	x				xx	xxx				xx	9	1.8
rog		x	xx				xx	x			6	1.2

In this way a preference index was computed for each of the 90 activities, separately for each age, each sex, and each intelligence group (control and gifted). Also a *mean* preference index for each activity was calculated for each sex of the control group as a whole, ages combined, and similarly for each sex of the gifted group, ages combined. Table 150 gives these preference indices for the 90 activities. It will be noted that each game has at each age a preference index for control boys, one for gifted boys, one for control girls, and one for gifted girls. The mean preference index for all the ages of a group are given in the last column. These are derived by averaging the age means of the other columns. The groups are designated as follows:

CB=Control Boys
GB=Gifted Boys
CG=Control Girls
GG=Gifted Girls.

TABLE 150.

PREFERENCE INDICES OF 90 ACTIVITIES FOR GIFTED AND CONTROL CHILDREN

		Ages									Mean for Group
		6–7	8	9	10	11	12	13	14	15–17	
Roll hoops	CB	—	25	21	13	10	9	6	10	5	13
	GB	11	8	7	10	7	4	3	—	—	7
	CG	—	10	14	9	7	10	5	4	3	8
	GG	12	9	8	6	8	4	1	—	—	7
Play jackstones	CB	—	6	7	4	3	1	1	3	4	4
	GB	11	2	1	2	1	1	1	—	—	3
	CG	—	16	21	9	10	10	5	5	3	10
	GG	21	14	9	12	13	12	8	—	—	13
Spin tops	CB	—	20	18	25	15	15	20	18	12	18
	GB	18	13	15	10	16	13	8	—	—	13
	CG	—	6	10	8	7	6	3	3	2	6
	GG	10	5	6	6	5	6	2	—	—	6
Play jackstraws	CB	—	3	14	7	6	5	3	1	3	5
	GB	11	8	8	4	5	2	0	—	—	6
	CG	—	7	11	10	9	4	2	2	2	6
	GG	10	5	5	4	7	4	6	—	—	6
Walk on stilts	CB	—	18	21	28	21	20	21	19	9	20
	GB	16	9	10	11	12	9	18	—	—	12
	CG	—	14	19	11	16	17	12	9	5	13
	GG	8	8	9	10	10	9	2	—	—	8
Fly kites	CB	—	20	33	27	24	25	25	23	18	24
	GB	20	15	16	16	19	11	12	—	—	16
	CG	—	11	19	10	15	8	10	5	3	10
	GG	12	8	7	7	6	6	2	—	—	7
Play with bow and arrow	CB	—	17	24	14	13	10	11	13	9	14
	GB	12	19	14	13	13	9	9	—	—	13
	CG	—	9	8	10	5	6	1	2	3	6
	GG	6	5	7	6	8	6	2	—	—	6
Coast or toboggan	CB	—	1	5	2	5	2	6	3	4	4
	GB	11	5	9	8	6	5	13	—	—	8
	CG	—	3	4	3	2	2	1	2	2	2
	GG	5	2	3	3	3	6	2	—	—	3
Ride bicycle	CB	—	21	30	33	35	33	43	47	45	36
	GB	19	24	23	32	35	30	35	—	—	28
	CG	—	13	16	17	33	30	27	25	17	22
	GG	14	8	8	9	19	14	12	—	—	12
Skate	CB	—	23	20	23	18	20	15	14	13	18
	GB	18	15	24	13	18	17	13	—	—	17
	CG	—	20	31	27	31	29	21	19	15	24
	GG	38	30	26	26	28	22	16	—	—	27
Ski	CB	—	1	3	2	4	1	2	1	1	2
	GB	9	3	2	1	2	2	4	—	—	3
	CG	—	4	2	2	1	1	0	0	3	2
	GG	1	0	0	0	1	1	0	—	—	0

		Ages									Mean for
		6–7	8	9	10	11	12	13	14	15–17	Group
Hike	CB	—	8	15	12	15	17	15	17	13	14
	GB	19	14	18	19	21	19	23	—	—	19
	CG	—	7	12	6	10	12	12	18	15	11
	GG	23	11	15	14	17	20	16	—	—	16
Do garden work	CB	—	28	22	24	19	27	23	18	28	24
	GB	17	11	14	13	13	9	7	—	—	12
	CG	—	20	21	21	21	16	11	11	17	17
	GG	30	10	14	12	10	15	8	—	—	14
Dance	CB	—	3	8	3	5	6	8	4	7	6
	GB	9	6	6	5	5	4	11	—	—	7
	CG	—	29	25	26	26	27	17	22	27	25
	GG	34	19	28	26	23	26	32	—	—	27
Shoot	CB	—	14	16	15	19	14	29	25	22	19
	GB	14	14	7	13	15	15	11	—	—	13
	CG	—	13	4	5	4	3	1	2	1	4
	GG	8	0	0	1	3	1	1	—	—	2
Fish	CB	—	13	18	13	14	13	19	18	17	16
	GB	16	12	15	16	16	13	17	—	—	15
	CG	—	9	11	8	6	6	4	4	3	6
	GG	15	4	4	8	9	9	5	—	—	8
Swim	CB	—	11	14	13	13	14	16	19	20	15
	GB	12	11	13	16	19	18	26	—	—	16
	CG	—	10	11	10	12	8	7	11	12	10
	GG	18	9	13	16	17	19	18	—	—	16
Ride horseback	CB	—	7	17	15	17	19	22	23	19	17
	GB	12	12	13	12	12	10	9	—	—	11
	CG	—	13	15	17	14	12	9	16	19	14
	GG	17	7	12	10	10	8	10	—	—	10
Row a boat	CB	—	9	12	7	12	10	15	9	14	11
	GB	9	11	11	14	16	9	17	—	—	12
	CG	—	10	6	7	3	7	3	7	5	6
	GG	5	5	4	7	7	5	9	—	—	6
Hunt	CB	—	2	16	14	19	11	22	20	19	15
	GB	13	8	6	7	7	7	6	—	—	8
	CG	—	6	4	5	3	2	1	3	2	3
	GG	7	0	0	0	0	0	1	—	—	1
Do plain sewing	CB	—	3	5	5	4	2	3	4	3	4
	GB	7	3	1	1	3	1	0	—	—	2
	CG	—	16	27	33	23	24	21	23	37	16
	GG	24	18	24	20	17	16	12	—	—	19
Cook a meal	CB	—	2	6	10	5	12	10	9	8	8
	GB	9	5	6	5	8	4	6	—	—	6
	CG	—	14	20	21	23	22	23	26	40	24
	GG	10	3	9	12	13	19	16	—	—	12
Knit, crochet or do fancy work	CB	—	0	5	3	3	3	1	1	2	2
	GB	8	2	2	1	1	0	0	—	—	2
	CG	—	4	10	15	13	15	17	14	26	14
	GG	15	10	14	10	12	11	5	—	—	11

		Ages								Mean for
		6–7	8	9	10	11	12	13	14	15–17	Group
	CB	—	19	19	25	24	28	33	23	26	25
Use	GB	19	22	25	25	25	23	32	—	—	24
tools	CG	—	4	4	7	3	1	1	2	3	3
	GG	17	3	2	6	6	3	1	—	—	5
Work	CB	—	6	12	6	12	13	16	18	19	13
with	GB	15	11	10	12	14	9	17	—	—	13
machinery	CG	—	3	3	5	2	0	2	1	1	2
	GG	4	1	0	2	1	1	1	—	—	1
	CB	—	31	36	30	20	26	19	17	11	24
Play	GB	28	19	22	22	19	10	11	—	—	19
tag	CG	—	30	43	33	33	31	24	16	13	28
	GG	42	32	30	27	24	21	12	—	—	27
Ring	CB	—	13	12	12	8	6	4	4	5	8
around	GB	12	5	3	1	1	1	0	—	—	3
the rosy	CG	—	25	25	26	16	15	5	4	7	15
	GG	27	14	10	6	5	2	2	—	—	9
	CB	—	12	12	13	9	6	3	3	5	9
London	GB	15	7	5	2	2	1	0	—	—	5
Bridge	CG	—	26	22	21	20	16	6	5	8	16
	GG	31	24	20	10	8	4	6	—	—	15
Farmer	CB	—	18	19	16	9	9	4	2	4	10
in the	GB	18	5	4	2	2	0	0	—	—	5
dell	CG	—	30	25	25	21	17	8	6	8	18
	GG	31	23	16	12	8	5	5	—	—	14
In and	CB	—	7	14	9	6	4	3	2	2	6
out the	GB	12	4	2	1	1	0	0	—	—	3
window	CG	—	18	17	18	17	13	8	5	7	13
	GG	22	16	11	8	5	3	1	—	—	9
	CB	—	24	26	30	19	27	20	17	9	22
Hide and	GB	32	14	13	17	15	10	8	—	—	16
seek	CG	—	31	39	37	27	24	18	15	13	26
	GG	41	27	30	23	22	17	24	—	—	26
	CB	—	9	17	19	9	12	6	6	5	10
Hop-	GB	20	8	6	5	5	2	1	—	—	7
scotch	CG	—	32	36	39	35	29	16	8	12	26
	GG	33	26	25	20	18	14	6	—	—	20
	CB	—	17	17	14	11	10	6	5	7	11
Drop the	GB	16	6	5	5	2	2	2	—	—	5
handkerchief	CG	—	22	26	27	19	16	10	5	11	17
	GG	30	22	13	9	8	5	2	—	—	13
	CB	—	6	11	13	7	9	4	4	3	7
Blind-	GB	17	6	5	2	4	2	1	—	—	5
fold	CG	—	19	18	20	11	12	7	5	7	12
	GG	22	16	15	10	9	6	3	—	—	12
	CB	—	11	12	9	9	8	10	7	4	9
Post-	GB	18	5	3	3	4	3	7	—	—	6
office	CG	—	15	12	9	13	13	8	8	8	11
	GG	17	6	6	4	7	5	2	—	—	7

		Ages									Mean for
		6–7	8	9	10	11	12	13	14	15–17	Group
Cat and mouse	CB	—	23	20	12	8	5	4	1	2	9
	GB	14	6	3	4	1	0	0	—	—	4
	CG	—	32	29	26	17	12	7	4	5	17
	GG	18	13	11	7	3	2	0	—	—	8
Red Rover	CB	—	3	12	8	10	5	3	2	3	6
	GB	6	4	1	3	2	0	0	—	—	2
	CG	—	9	6	6	5	4	3	1	1	5
	GG	11	2	5	2	1	1	1	—	—	3
Puss in the corner	CB	—	10	19	13	9	9	7	8	4	10
	GB	17	9	7	6	3	2	0	—	—	6
	CG	—	20	22	24	14	16	7	4	6	14
	GG	26	18	19	11	7	4	1	—	—	12
Pom-pom pull-away	CB	—	9	14	12	8	4	5	5	4	8
	GB	9	5	4	6	7	6	7	—	—	6
	CG	—	8	10	8	9	14	5	3	3	8
	GG	10	9	5	4	6	3	2	—	—	6
Black-man	CB	—	7	9	9	6	5	5	6	3	6
	GB	8	2	1	2	0	2	1	—	—	2
	CG	—	9	9	9	8	9	2	2	6	7
	GG	9	2	1	1	1	1	0	—	—	2
Marbles	CB	—	19	24	27	24	22	25	20	11	22
	GB	19	24	23	21	22	15	12	—	—	19
	CG	—	4	10	10	9	8	6	4	1	7
	GG	13	4	6	6	5	5	2	—	—	6
Duck on rock	CB	—	3	7	10	7	1	5	6	6	6
	GB	11	5	4	6	2	4	4	—	—	5
	CG	—	6	6	5	5	3	2	4	3	4
	GG	8	0	1	0	1	2	0	—	—	2
Follow the leader	CB	—	19	21	16	14	11	10	9	9	14
	GB	22	11	15	11	10	7	10	—	—	12
	CG	—	17	26	23	16	13	8	7	5	14
	GG	27	15	10	11	12	8	3	—	—	12
Anty over	CB	—	8	14	14	11	13	11	8	7	11
	GB	9	3	1	5	5	6	2	—	—	4
	CG	—	7	14	11	19	8	8	8	5	10
	GG	5	4	1	5	4	5	6	—	—	4
Dare base or prisoner's base	CB	—	6	11	12	10	12	6	6	6	9
	GB	11	8	8	8	6	6	7	—	—	8
	CG	—	5	9	18	23	20	13	1	10	12
	GG	8	1	4	2	11	6	4	—	—	5
Snap the whip	CB	—	21	23	17	14	13	14	11	9	15
	GB	11	10	10	12	9	8	9	—	—	10
	CG	—	8	15	15	13	14	6	6	6	10
	GG	11	9	7	8	9	6	2	—	—	7
Tug of war	CB	—	26	22	21	16	9	16	13	9	17
	GB	18	12	13	14	14	10	11	—	—	13
	CG	—	10	13	15	9	9	4	2	3	8
	GG	13	7	7	8	7	6	2	—	—	7

		Ages									Mean for Group
		6–7	8	9	10	11	12	13	14	15–17	
Roly-poly	CB	—	6	8	4	6	2	2	1	3	4
	GB	8	2	0	1	0	2	0	—	—	2
	CG	—	9	7	4	1	6	0	0	0	3
	GG	11	1	2	2	0	3	0	—	—	3
Jump the rope	CB	—	23	23	19	16	12	11	7	7	15
	GB	12	5	6	5	5	4	3	—	—	6
	CG	—	33	20	30	31	33	20	2	18	23
	GG	38	27	25	21	18	16	9	—	—	22
Leap-frog	CB	—	10	18	19	10	12	12	9	8	12
	GB	12	12	9	12	7	5	8	—	—	9
	CG	—	16	17	16	10	4	3	5	3	9
	GG	18	13	10	5	7	4	1	—	—	8
Fox and hounds	CB	—	7	5	9	7	4	5	4	3	5
	GB	9	6	5	4	4	2	3	—	—	5
	CG	—	8	6	6	2	4	0	17	1	6
	GG	6	2	1	1	1	1	2	—	—	2
Fox and geese	CB	—	17	14	14	11	13	11	10	6	12
	GB	11	4	4	4	3	2	3	—	—	5
	CG	—	19	14	15	15	12	6	5	8	12
	GG	12	6	3	2	1	1	0	—	—	4
Shinny	CB	—	6	6	11	8	8	8	7	5	8
	GB	7	8	11	6	4	4	3	—	—	6
	CG	—	5	4	3	5	3	2	0	0	3
	GG	6	1	2	2	2	2	0	—	—	2
Croquet	CB	—	0	5	7	6	5	6	4	2	5
	GB	9	5	7	7	10	7	6	—	—	7
	CG	—	2	4	4	4	6	2	4	3	4
	GG	10	5	7	11	7	10	12	—	—	9
Bowling	CB	—	1	6	6	4	2	4	4	4	4
	GB	8	6	2	5	3	2	5	—	—	4
	CG	—	4	3	5	2	1	0	0	0	2
	GG	3	1	0	1	1	1	1	—	—	1
Wrestling	CB	—	7	21	19	16	14	26	18	17	17
	GB	12	20	20	20	17	14	18	—	—	17
	CG	—	3	8	9	4	3	2	2	0	4
	GG	6	1	3	3	7	2	0	—	—	3
Baseball	CB	—	37	34	38	41	37	43	41	41	39
	GB	22	25	31	36	37	39	33	—	—	32
	CG	—	11	20	29	26	25	35	30	31	26
	GG	14	10	9	17	16	24	15	—	—	15
Racing or jumping	CB	—	19	19	21	24	21	18	16	19	20
	GB	18	19	19	21	21	19	21	—	—	20
	CG	—	18	19	22	20	18	11	13	10	16
	GG	19	14	13	16	15	12	8	—	—	14
Handball	CB	—	7	17	12	15	10	12	7	9	11
	GB	16	14	22	27	28	31	27	—	—	24
	CG	—	9	11	16	8	10	5	6	6	9
	GG	12	9	5	10	7	18	10	—	—	10

		Ages									Mean for
		6–7	8	9	10	11	12	13	14	15–17	Group
	CB	—	1	5	8	13	7	11	10	6	8
Soccer	GB	8	5	7	13	12	10	11	—	—	10
	CG	—	3	2	4	1	1	0	0	0	1
	GG	2	1	1	2	4	2	2	—	—	2
	CB	—	12	11	22	17	14	23	16	14	16
Boxing	GB	14	15	10	16	12	12	13	—	—	13
	CG	—	4	1	9	1	2	0	1	2	3
	GG	7	1	1	1	1	2	0	—	—	2
	CB	—	2	12	9	10	10	11	10	11	9
Tennis	GB	13	10	12	10	14	17	16	—	—	13
	CG	—	6	4	14	7	10	9	19	11	10
	GG	10	5	4	11	10	11	16	—	—	9
	CB	—	20	23	20	20	19	20	10	10	18
Volleyball	GB	11	5	4	8	11	7	6	—	—	8
	CG	—	6	11	23	21	26	17	12	22	17
	GG	8	8	8	6	11	15	13	—	—	10
	CB	—	12	17	15	23	18	25	19	27	20
Basketball	GB	9	7	8	14	15	11	20	—	—	12
	CG	—	7	10	13	8	15	12	17	18	13
	GG	5	6	4	4	9	14	12	—	—	8
	CB	—	10	20	15	27	17	20	16	18	18
Football	GB	12	16	14	19	18	14	24	—	—	17
	CG	—	4	6	12	4	5	2	3	4	5
	GG	5	1	3	1	4	1	0	—	—	2
	CB	—	6	5	4	3	0	1	2	3	3
Playing	GB	7	1	0	0	0	0	0	—	—	1
with dolls	CG	—	43	39	35	26	24	13	5	9	24
	GG	43	33	33	20	12	9	5	—	—	22
	CB	—	6	5	3	3	3	1	1	1	3
Play	GB	5	1	3	1	0	1	0	—	—	2
"dress up"	CG	—	33	34	34	24	21	11	7	8	22
	GG	36	34	29	20	14	9	6	—	—	21
	CB	—	19	9	8	5	1	2	3	2	6
Play house	GB	9	2	2	0	0	0	0	—	—	2
	CG	—	37	36	33	23	20	10	6	5	21
	GG	38	32	25	18	11	7	0	—	—	19
	CB	—	16	12	8	6	5	2	3	2	7
Play store	GB	12	4	4	2	2	0	0	—	—	3
	CG	—	29	23	25	17	19	9	6	4	17
	GG	33	24	21	12	11	5	0	—	—	15
	CB	—	17	16	8	7	3	2	4	2	8
Play school	GB	13	5	4	2	2	1	0	—	—	4
	CG	—	36	33	27	22	21	13	11	9	21
	GG	36	30	22	11	13	7	2	—	—	17
	CB	—	10	10	11	9	6	6	3	2	7
Simon says	GB	16	6	10	5	4	2	1	—	—	6
thumbs up	CG	—	15	14	18	18	10	7	4	3	11
	GG	19	16	15	7	7	5	3	—	—	10

		Ages									Mean for Group
		6–7	8	9	10	11	12	13	14	15–17	
Play church	CB	—	3	8	3	4	1	1	6	1	4
	GB	6	1	1	0	0	0	0	—	—	1
	CG	—	18	17	13	7	8	1	1	3	8
	GG	16	4	5	1	1	1	0	—	—	4
Dominoes	CB	—	10	13	13	8	13	7	8	6	10
	GB	14	12	15	14	14	9	10	—	—	13
	CG	—	8	14	14	9	14	7	7	5	10
	GG	16	13	12	13	12	12	6	—	—	12
Crokinole	CB	—	0	5	5	4	0	2	0	1	2
	GB	9	1	4	3	9	5	7	—	—	5
	CG	—	2	2	4	1	1	1	1	1	2
	GG	4	1	1	3	4	2	1	—	—	2
Parchesi	CB	—	8	6	4	6	8	2	0	2	4
	GB	11	6	11	10	10	7	6	—	—	9
	CG	—	3	5	3	2	5	2	5	3	4
	GG	9	9	7	12	11	14	8	—	—	10
Tiddledy-winks	CB	—	11	13	11	6	5	3	4	1	7
	GB	11	6	9	8	6	5	2	—	—	7
	CG	—	10	10	11	9	10	3	2	3	7
	GG	13	10	8	9	7	8	2	—	—	8
Back-gammon	CB	—	0	4	4	3	0	1	1	1	2
	GB	5	1	1	1	2	0	1	—	—	1
	CG	—	2	3	3	1	0	0	0	0	1
	GG	3	1	0	0	0	0	0	—	—	0
Authors	CB	—	2	6	6	3	2	1	2	1	3
	GB	14	4	6	5	8	6	5	—	—	7
	CG	—	3	3	7	4	4	3	4	3	4
	GG	9	6	5	9	9	9	5	—	—	9
Snap	CB	—	10	9	7	6	2	3	2	2	5
	GB	9	2	4	1	3	1	2	—	—	3
	CG	—	7	11	7	4	4	2	3	2	5
	GG	6	2	1	3	2	2	2	—	—	3
Guessing games	CB	—	9	6	10	9	8	5	7	3	7
	GB	15	6	12	8	8	7	2	—	—	8
	CG	—	11	13	23	17	14	12	9	12	14
	GG	23	14	9	20	15	17	11	—	—	15
Cards	CB	—	20	21	16	16	23	13	17	9	17
	GB	23	13	20	19	19	15	17	—	—	18
	CG	—	11	16	19	16	17	15	17	18	16
	GG	28	19	16	18	22	20	16	—	—	20
History cards	CB	—	1	4	7	7	6	3	1	3	4
	GB	6	4	5	4	5	3	0	—	—	4
	CG	—	3	5	7	5	3	1	3	7	4
	GG	7	2	2	4	5	0	0	—	—	3
Geography cards	CB	—	0	6	5	6	5	4	3	3	4
	GB	6	3	5	4	6	3	2	—	—	4
	CG	—	5	3	8	3	2	2	2	6	4
	GG	7	2	4	2	2	1	2	—	—	3

		Ages								Mean for Group
		6–7	8	9	10	11	12	13	14	15–17	
Charades	CB	—	0	4	4	3	0	1	1	1	2
	GB	6	1	3	2	2	1	1	—	—	2
	CG	—	4	2	3	1	2	1	2	0	0
	GG	5	0	1	7	5	8	9	—	—	5
Anagrams or word building	CB	—	6	8	8	6	5	4	4	3	5
	GB	6	3	5	2	4	2	0	—	—	3
	CG	—	6	3	10	5	10	3	2	2	5
	GG	11	2	1	2	2	3	2	—	—	3
Solve puzzles	CB	—	0	6	8	10	12	9	9	3	7
	GB	14	11	16	13	16	8	18	—	—	14
	CG	—	5	9	15	11	15	11	10	10	11
	GG	12	14	17	13	15	15	19	—	—	15
Checkers	CB	—	8	18	17	13	17	17	16	15	15
	GB	24	15	20	20	23	18	23	—	—	20
	CG	—	13	11	17	10	14	11	13	15	13
	GG	25	14	15	14	17	17	14	—	—	16
Chess	CB	—	1	6	4	4	1	3	1	2	3
	GB	6	5	4	3	9	7	11	—	—	6
	CG	—	3	1	5	1	2	1	1	1	2
	GG	6	1	2	1	2	2	0	—	—	2
Pool	CB	—	10	11	6	8	3	6	7	9	7
	GB	6	5	3	5	6	3	7	—	—	5
	CG	—	6	2	2	1	2	0	1	0	2
	GG	7	2	0	1	1	3	0	—	—	2
Billiards	CB	—	4	3	4	8	2	3	2	7	4
	GB	9	5	4	5	4	2	6	—	—	5
	CG	—	4	1	3	0	2	1	0	0	2
	GG	6	0	0	0	1	2	0	—	—	1

It was thought that a comparison of these preference indices for the gifted and control groups might show significant influence of the factor of intelligence in determining play interests. It is seen from Table 150, however, that these were determined chiefly by sex and age and only to a slight extent by intelligence. This is shown by the following correlations between the mean preference indices of the ninety games for the boys and girls of the two groups (using the figures of the last column in Table 150):

	Pearson r
Gifted boys vs. control boys	.83 ±.022
Gifted boys vs. gifted girls	.20 ±.068
Gifted boys vs. control girls	.18 ±.069
Control boys vs. control girls	.35 ±.062
Control boys vs. gifted girls	.22 ±.068
Gifted girls vs. control girls	.82 ±.022

That is, the correlation between two opposite-sex groups is

always low, even in the same intelligence class; that between two same-sex groups is always high, even if the intelligence class is different. These correlations offer no support to the popular belief that the gifted boy is effeminate in his play interests. In fact, the correlation between gifted boys and either gifted or control girls (.20 and .18) is lower than that between control boys and either of the feminine groups (.35 and .22).

The preference indices of Table 150, although they make possible interesting sex comparisons, are not, as they stand, satisfactory preference indices of the various activities. To a degree they are invalidated by the fact that the figures for the four groups (CB, GB, CG, and GG) are not directly comparable, since they are affected by the tendency of some of the groups to mark more or fewer activities than do other groups. This defect can be remedied by transmuting the raw preference indices of each group into $\frac{x}{\sigma}$ values. For example, the mean preference indices for the CB group (last column of Table 150) were distributed, the σ was calculated, and each of the 90 indices was given its $\frac{x}{\sigma}$ value. This was done for each of the groups CB, GB, CG, and GG, giving four sets of $\frac{x}{\sigma}$ values, as shown in Table 151.

TABLE 151.

PREFERENCE INDICES OF ACTIVITIES EXPRESSED IN $\frac{x}{\sigma}$ VALUES

Series 1.	CB	GB	CG	GG
Roll hoops	+0.28	−0.29	−0.36	−0.34
Play jackstones	−0.96	−0.89	−0.08	+0.53
Spin tops	+0.96	+0.61	−0.64	−0.49
Play jackstraws	−0.82	−0.44	−0.64	−0.49
Walk on stilts	+1.24	+0.46	+0.35	−0.20
Fly kites	+1.78	+1.06	−0.08	−0.34
Play with bow and arrow	+0.41	+0.61	−0.64	−0.49
Coast or toboggan	−0.96	−0.14	−1.21	−0.92
Ride bicycle	+3.43	+2.86	+1.62	+0.38
Skate	+0.96	+1.21	+1.90	+2.56
Ski	−0.23	−0.89	−1.21	−1.36
Hike	+0.41	+1.51	+0.06	+0.97
Do garden work	+1.78	+0.46	+0.91	+0.68
Dance	−0.68	−0.29	+0.63	+2.56
Shoot	+1.10	+0.61	−0.93	−1.07

Series 1 (continued).	CB	GB	CG	GG
Fish	+0.69	+0.91	−0.64	−0.20
Swim	+0.55	+1.06	−0.08	+0.97
Ride horseback	+0.82	+0.31	+0.49	+0.09
Row a boat	0.00	+0.46	−0.64	−0.49
Hunt	+0.55	−0.14	−0.07	−1.21
Do plain sewing	−0.54	−1.04	+0.77	+1.40
Cook a meal	−0.41	−0.44	+1.90	+0.38
Knit, crochet or do fancy work	−1.23	−1.04	+0.49	+0.24
Use tools	+1.92	+2.26	−1.07	−0.63
Work with machinery	+0.28	+0.61	−1.21	−1.21
Series 2.				
Play tag	+1.78	+1.51	+2.47	+2.56
Ring around the rosy	−0.41	−0.89	+0.63	−0.05
London Bridge	−0.27	−0.59	+0.77	+0.82
Farmer in the dell	−0.13	−0.59	+1.05	+0.68
In and out the window	−0.68	−0.89	+0.35	−0.05
Hide and seek	+1.51	+1.06	+2.19	+2.42
Hopscotch	−0.13	−0.29	+2.19	+1.55
Drop the handkerchief	0.00	−0.59	+0.91	+0.53
Blindfold	−0.54	−0.59	+0.20	+0.38
Postoffice	−0.27	−0.44	+0.06	−0.34
Cat and mouse	−0.27	−0.74	+0.91	−0.20
Red Rover	−0.68	−1.04	−0.79	−0.92
Puss in the corner	−0.13	−0.44	+0.49	+0.38
Pom-pom pull-away	−0.41	−0.44	−0.36	−0.49
Blackman	−0.68	−1.04	−0.50	−1.07
Marbles	+1.51	+1.51	−0.50	−0.49
Duck on rock	−0.68	−0.59	−0.93	−1.07
Follow the leader	+0.41	+0.46	+0.49	+0.38
Anty over	0.00	−0.74	−0.08	−0.78
Dare base or prisoner's base	−0.27	−0.14	+0.20	−0.63
Snap the whip	+0.55	+0.16	−0.08	−0.34
Tug of war	+0.82	+0.61	−0.36	−0.34
Roly-poly	−0.96	−1.04	−1.07	−0.92
Jump the rope	+0.55	−0.44	+1.76	+1.84
Leapfrog	+0.14	+0.01	−0.22	−0.20
Fox and hounds	−0.82	−0.59	−0.64	−1.07
Fox and geese	+0.14	−0.59	+0.20	−0.78
Shinny	−0.41	−0.44	−1.07	−1.07
Croquet	−0.82	−0.29	−0.93	−0.05
Bowling	−0.96	−0.74	−1.21	−1.21
Wrestling	+0.82	+1.21	−0.93	−0.92
Baseball	+3.84	+3.46	+2.19	+0.82
Racing or jumping	+1.23	+1.66	+0.77	+0.68
Handball	0.00	+2.26	−0.22	+0.09
Soccer	−0.41	+0.16	−1.35	−1.07

Series 2 (continued).	CB	GB	CG	GG
Boxing	+0.69	+0.61	−1.07	−1.07
Tennis	−0.27	+0.61	−0.08	−0.05
Volleyball	+0.96	−0.14	+0.91	+0.09
Basketball	+1.23	+0.46	+0.35	−0.20
Football	+0.96	+1.21	−0.79	−1.07
Series 3.				
Play with dolls	−1.09	−1.19	+1.90	+1.84
Play "dress up"	−1.09	−1.04	+1.62	+1.69
Play house	−0.68	−1.04	+1.48	+1.40
Play store	−0.54	−0.89	+0.91	+0.82
Play school	−0.41	−0.74	+1.48	+1.11
Simon says thumbs up	−0.54	−0.44	+0.06	+0.09
Play church	−0.96	−1.19	−0.36	−0.78
Dominoes	−0.13	+0.61	−0.08	+0.38
Crokinole	−1.23	−0.59	−1.21	−1.07
Parchesi	−0.96	+0.01	−0.93	+0.09
Tiddledy-winks	−0.54	−0.29	−0.50	−0.20
Backgammon	−1.23	−1.19	−1.35	−1.36
Authors	−1.09	−0.29	−0.93	−0.05
Snap	−0.82	−0.89	−0.79	−0.92
Guessing games	−0.54	−0.14	+0.49	+0.82
Cards	+0.82	+1.36	+0.77	+1.55
History cards	−0.96	−0.74	−0.93	−0.92
Geography cards	−0.96	−0.74	−0.93	−0.92
Charades	−1.23	−1.04	−0.21	−0.63
Anagrams or word building	−0.82	−0.89	−0.79	−0.92
Solve puzzles	−0.54	−0.74	+0.06	+0.82
Checkers	+0.55	+1.66	+0.35	+0.97
Chess	−1.09	−0.44	−1.21	−1.07
Pool	−0.54	−0.59	−1.21	−1.07
Billiards	−0.96	−0.59	−1.21	−1.21

The above figures are to be read as follows (first row of table):

With the control boys, rolling hoops stands .28 of a σ *above* the mean preference index of the 90 activities for that group; with the gifted boys, .29 σ *below* the mean of the 90 activities for that group, etc. The figures of the four columns are now comparable and show such difference between gifted and control as the following:

(1) As compared with the control boys, *gifted boys show much greater preference for* jackstraws, coasting, hiking, dancing, swimming, rowing, croquet, wrestling, racing or

jumping, handball, soccer, tennis, dominoes, crokinole, parchesi, authors, guessing games, cards, checkers, and chess; *and much less preference for* rolling hoops, walking on stilts, flying kites, riding bicycle, garden work, shooting, riding horseback, hunting, ring around the rosy, farmer in the dell, drop the handkerchief, cat and mouse, anty over, jump the rope, fox and geese, volleyball, basketball, and playing house.

(2) As compared with the control girls, *gifted girls show much greater preference for* jackstones, skating, hiking, dancing, fishing, swimming, sewing, using tools, shinny, wrestling, dominoes, parchesi, authors, guessing games, cards, puzzles, and chess; *and much less preference for* walking on stilts, riding bicycle, hunting, cooking, ring around the rosy, hopscotch, cat and mouse, anty over, dare base, fox and geese, baseball, racing or jumping, handball, volleyball, basketball, and charades.

The gifted and control girls differ from each other on much the same activities as do gifted and control boys, and the difference is usually in the same direction. Some of these differences may be due to the influence of locality. (It will be recalled that Control Group B is for the most part somewhat less urban than the gifted group). Again, some of the differences may be due to the influence of social status, the gifted on the whole coming from homes of superior education and culture. Other differences, however, are probably dependent upon intelligence; for example, the preference of the gifted for such games as cards, authors, puzzles, checkers, chess, etc.

Masculinity Indices of the Ninety Activities

By comparing the $\frac{x}{\sigma}$ preference indices of control boys with those of control girls in columns 1 and 3 of Table 151, it is possible to compute a normal "masculinity index" for each activity. The first step in this was to find for each activity the algebraic difference between the values in column 1 and column 3 (control group) for each of the 90 activities. Next, these differences were distributed, their σ computed, and the $\frac{x}{\sigma}$ difference found for each of the 90

activities. These are the masculinity indices sought. This method gave plus $\frac{x}{\sigma}$ values for activities more preferred by boys than by girls, and minus values for activities more preferred by girls. To avoid the use of negative quantities, equivalent numerical indices were computed, on a scale of 1 to 25, with 13 corresponding to zero values of $\frac{x}{\sigma}$, 1 being the lowest negative value of $\frac{x}{\sigma}$ and 25 the highest positive value. This gave the masculinity indices of Table 152.

From Table 152 the order of the activities from most to least masculine is found to be as follows:

24. Tools.
23. ——
22. ——
21. Shooting.
20. Kites, bicycle, marbles, wrestling, boxing, football.
19. Tops, machinery, baseball.
18. Fishing.
17. Bow and arrow, skiing, tug of war, soccer.
16. Stilts, garden work, basketball, pool.
15. Hoops, swimming, rowing, hunting, snap the whip, shinny, racing and jumping.
14. Coasting, hiking, riding, duck on rock, leapfrog, bowling, handball, backgammon, checkers, chess, billiards.
13. (*Line of neutrality.*) Red Rover, pom-pom pull-away, follow the leader, anty over, roly-poly, fox and geese, croquet, volleyball, dominoes, crokinole, parchesi, tiddledy-winks, snap, cards, history cards, geography cards, word building.
12. Jackstraws, postoffice, blackman, fox and hounds, tennis, authors.
11. Tag, hide and seek, puss in corner, dare base, Simon says, playing church, solving puzzles.
10. Jackstones, skating, drop the handkerchief, blindfold.
9. Ring around the rosy, London Bridge, farmer in the dell, in and out the window, cat and mouse, jumping rope, guessing games, charades.
8. Dancing, sewing, playing store.
7. Knitting or crocheting.
6. Playing school.
5. Cooking, playing house.
4. Hopscotch.
3. Dressing up.
2. Dolls.

TABLE 152.

MASCULINITY INDICES OF 90 ACTIVITIES BASED ON SEX DIFFERENCES FOUND IN THE CONTROL GROUP

(Above 13 = more liked by boys; below 13, more liked by girls)

15 Roll hoops	11 Play tag	2 Play with dolls
10 Play jackstones	9 Ring around rosy	3 Play "dress up"
19 Spin tops	9 London Bridge	5 Play house
12 Play jackstraws	9 Farmer in the dell	8 Play store
16 Walk on stilts	9 In and out window	6 Play school
20 Fly kites	11 Hide and seek	11 Simon says thumbs up
17 Bow and arrow	4 Hopscotch	11 Play church
14 Coast or toboggan	10 Drop handkerchief	13 Dominoes
20 Ride bicycle	10 Blindfold	13 Crokinole
10 Skate	12 Postoffice	13 Parchesi
17 Ski	9 Cat and mouse	13 Tiddledy-winks
14 Hike	13 Red Rover	14 Backgammon
16 Do garden work	11 Puss in corner	12 Authors
8 Dance	13 Pom-pom pull-away	13 Snap
21 Shoot	12 Blackman	9 Guessing games
18 Fish	20 Marbles	13 Cards
15 Swim	14 Duck on rock	13 History cards
14 Ride horseback	13 Follow the leader	13 Geography cards
15 Row a boat	13 Anty over	9 Charades
15 Hunt	11 Dare base	13 Word building
8 Do plain sewing	15 Snap the whip	11 Solve puzzles
5 Cook a meal	17 Tug of war	14 Checkers
7 Knit or crochet	13 Roly-poly	14 Chess
24 Use tools	9 Jump rope	16 Pool
19 Work with machinery	14 Leapfrog	14 Billiards
	12 Fox and hounds	
	13 Fox and geese	
	15 Shinny	
	13 Croquet	
	14 Bowling	
	20 Wrestling	
	19 Baseball	
	15 Racing or jumping	
	14 Handball	
	17 Soccer	
	20 Boxing	
	12 Tennis	
	13 Volleyball	
	16 Basketball	
	20 Football	

Masculinity Ratings of the Children

The masculinity indices of the activities were not derived primarily for the purpose of comparing the activities themselves, but to serve as the basis of masculinity ratings of the individual children. It is obvious that when the activities have been rated for masculinity it will be possible so to rate the child, on the basis of the activity preferences which he expresses. The method of accomplishing this may be illustrated by the following actual responses of a child:

Activity	Responses Given in Exercise 2	Responses Given in Exercise 3	Total Point Score Value of Responses in Exercises 2 and 3. (See p. 395)		Masculinity Index of the Activity. (See Table 152)		Masculinity Score of the Responses for Each Activity
Roll hoops	x		1	×	15	=	15
Skate	x		1	×	10	=	10
Hike		x	1	×	14	=	14
Shoot	x		1	×	21	=	21
Row a boat	xx	xxx	6	×	15	=	90
Dare base	x		1	×	11	=	11
Baseball	xx	xxx	6	×	19	=	114
Handball	xx	xx	4	×	14	=	56
Soccer	x		1	×	17	=	17
Boxing	xx	x	3	×	20	=	60
Volleyball	x		1	×	13	=	13
Basketball	x	x	2	×	16	=	32
Football	x		1	×	20	=	20
Parchesi		x	1	×	13	=	13
Checkers	x	x	2	×	14	=	28
Total point value of responses			32				
Masculinity score of responses							514

Dividing 514 by 32 gives a masculinity rating of 16 for this child.

A masculinity rating was computed for each child of the gifted and control groups. The distributions of these ratings, with means and S.D's are given in tables 153 and 154.

TABLE 153a.

MASCULINITY RATINGS OF CONTROL AND GIFTED BOYS, BY AGE

Rating	6–7		8		9		10		11		12		13		14	15–17	Total 8–13	
	G	C	G	C	G	C	G	C	G	C	G	C	G	C	C	C	G
20							1			1						1	1
19					1		2			0		1				1	3
18			3		0		1	2		0	2	2		2	3	4	6
17	1		2		5	3	7	3	12	2	4	6	3	6	7	14	33
16	2		10	4	7	2	21	5	16	7	15	16	7	11	12	34	76
15	2	2	8	3	15	7	23	7	25	7	15	14	6	10	5	40	92
14	2	3	15	4	14	9	12	8	15	8	4	2	2	4	3	34	62
13	7	3	3	8	3	8	1	7		4	1	1				31	8
12	2	1			3		2		1					1		1	6
11	1		1				1										2
10						1										1	
9																	
8																	
7																	
6																	
5					1												1
Total	17	9	42	19	49	30	71	32	69	29	41	42	18	34	30	161	290
Mean	13.71	13.67	14.95	14.16	14.63	14.27	15.38	14.84	15.32	15.00	15.56	15.81	15.61	15.65	16.07	14.90	15.22
S. D.	1.57	0.94	1.45	1.18	1.90	1.46	1.48	1.49	1.08	1.49	1.04	1.12	0.89	1.24	1.09	1.49	1.45

TABLE 153b.

MASCULINITY RATINGS OF CONTROL AND GIFTED GIRLS, BY AGE

Rating	6–7 G	8 C	8 G	9 C	9 G	10 C	10 G	11 C	11 G	12 C	12 G	13 C	13 G	14 C	15–17 C	Total 8–13 C	Total 8–13 G
20																	
19																	
18																	
17											1	1				1	1
16									1		0	0				0	1
15					1		1	1	3		1	0		2		1	6
14			1		0	1	3	1	4		7	5	1	5	1	7	16
13	2		1	2	1	1	3	4	6	5	7	5	5	15	5	17	23
12	4	6	5	7	5	8	8	13	17	8	13	14	6	12	6	56	54
11	8	4	8	5	15	3	16	6	16	8	10	13	4	10	6	39	69
10	4	7	6	6	12	7	10	6	2	4	3	6	1	4	5	36	34
9	2	2	8	6	6	2	4	4	2			1			0	15	20
8	1	2	1	1	3	1	0					1			1	5	4
7			2		1		1										4
6																	
5																	
Total	21	21	32	27	44	23	46	35	51	25	42	46	17	48	24	177	232
Mean	10.86	10.48	10.28	10.63	10.41	10.96	11.11	11.40	12.02	11.56	12.31	11.74	12.06	12.27	11.46	11.23	11.35
S. D.	1.24	1.26	1.59	1.34	1.42	1.40	1.51	1.42	1.45	0.98	1.44	1.54	1.00	1.25	1.35	1.45	1.65

TABLE 154.

SIGNIFICANCE OF THE MASCULINITY DIFFERENCES FOUND IN TABLES 152 AND 153

	Control and Gifted Boys			Control and Gifted Girls		
Age	Diff. between means	σ of the diff.	Diff. / σ diff.	Diff. between means	σ of the diff.	Diff. / σ diff.
8	1.28	0.385	3.32	–0.20	0.393	–0.51
9	0.47	0.383	1.23	–0.22	0.335	–0.66
10	1.11	0.319	3.48	+0.15	0.367	–0.41
11	0.48	0.294	1.63	+0.62	0.314	+1.97
12	0.56	0.321	1.74	+0.75	0.296	+2.53
13	–0.20	0.272	–0.74	+0.32	0.332	+0.96
Total	0.32	0.145	2.21	+0.12	0.154	+0.78

It will be seen that the difference is as great as twice the σ of the difference only at the following ages: for boys, at 8 and 11; for girls, at 11 and 12.

Figure 25 gives the age curves for mean masculinity ratings of gifted and control groups by sex.

It will be recalled that in the establishment of the masculinity index, 13 was the value arbitrarily assigned to the game of neutral masculinity, with a range of from 1 to 25. This fact must be kept in mind in the interpretation of tables 152 and 153 and Figure 25.

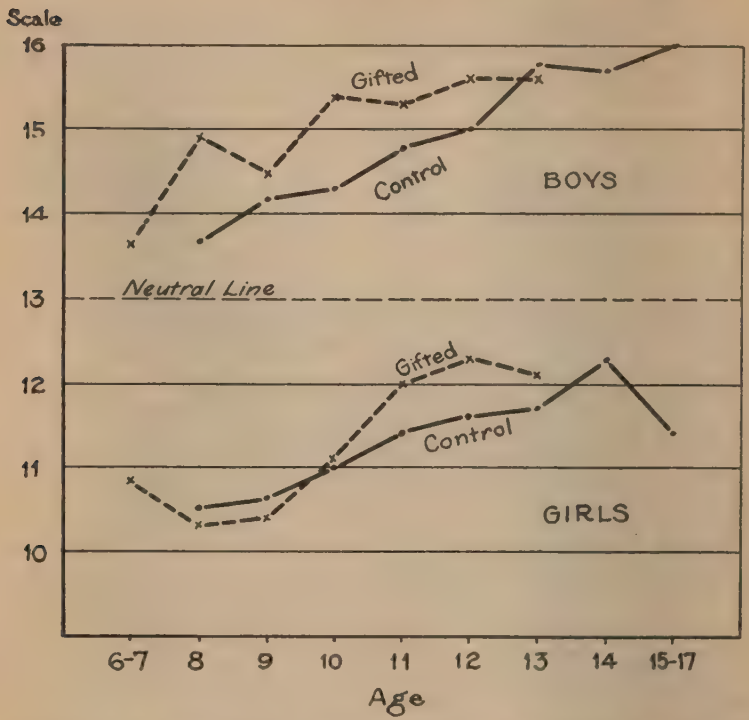
A comparison of the curve for gifted boys with that for control boys confirms the conclusions on page 404 regarding the normal masculinity of the bright boy. The mean masculinity index for gifted boys is definitely higher than that of control boys at each age until 13, where it is practically the same as for the control boys. In the case of gifted girls the curve is somewhat irregular, but its general tendency is to run as high as that for the control girls. One striking fact about the curves of mean masculinity ratings of the control girls is the noticeable falling off in masculinity which occurs after the age of 14. The gifted girls show a slight tendency in this direction after age 12.

Table 155 gives the proportion of gifted at each age in various percentile ranges of the control group.

MATURITY INDICES OF ACTIVITIES

From Table 150, showing the amount of preference expressed by the control children of each age for each ac-

FIGURE 25.
MEAN MASCULINITY RATINGS BY AGE, GIFTED AND CONTROL GROUPS



tivity, it is possible to compute for each activity a maturity index. First, for a given activity curves were plotted for the control boys and control girls, showing for each sex the amount of increase or decrease of preference by age. By means of mechanical smoothings the tendency of a curve was then expressed in a straight line. The significant factor is the size of the angle, positive or negative, included between this line and a horizontal line projected from its point of departure. An activity showing decreasing popularity with age would give an angle in the fourth quadrant, a negative angle; one showing increasing popularity with age, an angle in the first quadrant, or positive angle. Since the size of the angle is affected by the scale on which the curve

Table 155.

Per Cent of Masculinity Ratings of Gifted in Various Percentile Ranges of Control Group

Boys	Proportion of Gifted by Age in Each Class						
Percentile Ranges of Control Group	6 and 7	8	9	10	11	12	13
Highest 5%	29.4%	54.8%	21.3%	9.8%	1.5%	7.3%	0.00%
Next 20%	5.9%	14.3%	34.0%	47.8%	20.6%	31.7%	33.3%
Middle 50%	52.9%	31.0%	36.2%	36.6%	57.4%	56.1%	33.3%
Next 20%	0.00%	0.00%	4.3%	0.00%	19.1%	2.4%	33.3%
Lowest 5%	11.8%	0.00%	4.3%	5.6%	1.5%	2.4%	0.00%
Girls							
Highest 5%	19.0%	6.3%	4.5%	9.1%	17.6%	22.0%	0.0%
Next 20%	9.5%	9.4%	9.1%	13.6%	29.4%	22.0%	41.2%
Middle 50%	61.9%	53.1%	65.9%	54.5%	45.1%	39.0%	41.2%
Next 20%	9.5%	25.0%	18.2%	20.5%	3.9%	17.1%	17.6%
Lowest 5%	0.0%	6.3%	2.3%	2.3%	3.9%	0.0%	0.0%

is plotted, the tangents of the angles have been compared, instead of the angles themselves. Finally, all tangents were expressed as multiples of the tangent of an angle of 6°, which is approximately an even decimal (.1). Thus, the ratio of a given angle's tangent to the tangent of an angle of 6° becomes the maturity index of that activity. These ratios ranged from +5.95 for bicycle riding (control boys), showing a very rapid increase of interest with age, to —11.34 for doll play (gifted girls), showing a very rapid decrease of interest. Table 156 gives the maturity indices of all the activities by age, sex, and intelligence.

TABLE 156.

MATURITY INDICES OF ACTIVITIES IN TERMS OF $\frac{\text{TAN.} <}{\text{TAN.} < 6°}$

Series 1.	(1) Control Boys	(2) Control Girls	(3) Gifted Boys	(4) Gifted Girls
Roll hoops	−5.27	−2.55	−1.85	−2.73
Play jackstones	−1.17	−4.04	+0.83	−1.68
Spin tops	−0.83	−0.83	−2.20	−1.51
Play jackstraws	−1.17	−1.17	−2.55	−2.55
Walk on stilts	−1.17	−1.85	+1.51	−1.17
Fly kites	−1.17	−2.73	−2.20	−2.02
Play with bow and arrow	−2.55	−2.02	−3.28	−1.00
Coast or toboggan	+0.67	0.00	+1.34	+0.33
Ride bicycle	+5.95	+0.67	+1.00	+2.37
Skate	−2.37	−2.91	−0.17	−4.85
Ski	−0.50	−0.67	−0.50	+0.17
Hike	+1.68	+2.20	+2.91	+1.68
Do garden work	−1.00	−3.84	−1.51	−1.68
Dance	0.00	−2.20	+1.00	+1.34
Shoot	+3.84	−2.20	+1.17	−0.17
Fish	+1.17	−1.85	+0.83	−0.17
Swim	+1.85	−0.17	+4.44	+2.37
Ride horseback	+3.84	−0.33	−1.17	−0.83
Row a boat	+1.00	−0.83	+1.68	+1.17
Hunt	+3.84	−1.34	−0.67	−0.17
Do plain sewing	+4.24	+0.33	−1.00	−3.65
Cook a meal	+1.85	+3.65	−0.33	+4.04
Knit, crochet or do fancy work	−0.50	+3.46	−0.83	−2.20
Use tools	+2.91	−1.17	+2.02	−1.00
Work with machinery	+3.84	−1.00	+1.00	−0.17

Series 2.	(1) Control Boys	(2) Control Girls	(3) Gifted Boys	(4) Gifted Girls
Play tag	−5.49	−4.64	−4.64	−6.91
Ring around the rosy	−2.91	−6.66	−1.51	−5.06
London Bridge	−2.73	−6.18	−2.37	−7.43
Farmer in the dell	−5.72	−6.91	−2.02	−6.66
In and out the window	−2.73	−4.04	−1.17	−5.06
Hide and seek	−2.91	−6.42	−3.28	−3.84
Hopscotch	−2.55	−7.71	−2.73	−7.43
Drop the handkerchief	−4.04	−6.42	−2.02	−6.91
Blindfold	−1.68	−4.44	−2.20	−5.06
Postoffice	−1.17	−1.00	−0.67	−1.68
Cat and mouse	−6.18	−9.19	−2.02	−4.44
Red Rover	−1.68	−1.68	−1.51	−1.68
Puss in the corner	−2.55	−5.27	−3.46	−7.43
Pom-pom pull-away	−2.91	−1.34	+0.83	−2.02
Blackman	−0.17	−2.02	−0.67	−0.67
Marbles	−1.00	−1.17	−3.65	−0.83
Duck on rock	−1.00	−0.83	−1.00	0.00
Follow the leader	−3.84	−5.27	−2.73	−3.65
Anty over	−0.83	−1.51	−0.50	+1.51
Dare base or prisoner's base	−1.00	+3.09	−0.83	+1.17
Snap the whip	−3.46	−2.02	−0.83	−2.02
Tug of war	−3.84	−3.09	−1.17	−2.02
Roly-poly	−2.02	−2.55	−0.50	−1.34
Jump the rope	−4.85	−5.06	−1.00	−6.66
Leapfrog	−2.02	−5.06	−1.84	−4.24
Fox and hounds	−0.83	−0.33	−1.17	−0.17
Fox and geese	−1.85	−3.46	−1.00	−1.68
Shinny	+0.17	−1.00	−1.85	−0.67
Croquet	+0.50	0.00	+0.67	+1.85
Bowling	+0.17	−1.34	−0.33	0.00
Wrestling	+1.85	−1.68	−0.67	−0.50
Baseball	+2.02	+5.06	+4.04	+4.04
Racing or jumping	+0.50	−3.09	+0.33	−2.73
Handball	−1.34	−1.51	+5.06	+2.20
Soccer	+2.37	−0.83	+1.17	+1.17
Boxing	+1.85	−1.17	0.00	−0.17
Tennis	+1.68	+1.68	+2.20	+3.65
Volleyball	−2.37	+3.84	0.00	+2.37
Basketball	+2.37	+2.02	+3.84	+3.46
Football	+1.85	−0.50	+3.09	−0.83

Series 3.	(1) Control Boys	(2) Control Girls	(3) Gifted Boys	(4) Gifted Girls
Play with dolls	−1.51	−10.57	0.00	−11.34
Play "dress up"	−1.34	−7.98	−0.67	−9.85
Play house	−3.84	−9.51	−0.67	−11.34
Play store	−3.84	−6.91	−1.68	−8.87
Play school	−3.84	−6.91	−2.02	−9.19
Simon says thumbs up	−2.20	−4.04	−3.46	−5.27
Play church	−0.83	−5.27	−0.33	−1.68
Dominoes	−1.68	−1.34	−1.85	−2.02
Crokinole	−0.83	−0.67	+1.51	−0.33
Parchesi	−1.68	−0.17	−1.17	+1.17
Tiddledy-winks	−3.65	−2.20	−2.37	−1.85
Backgammon	−0.67	−0.67	0.00	0.00
Authors	−1.34	−0.17	−0.50	+0.17
Snap	−2.55	−1.85	−1.17	−0.17
Guessing games	−0.83	−1.34	−2.37	−0.50
Cards	−1.85	+0.83	−1.00	−0.33
History cards	0.00	−1.17	−1.85	−1.85
Geography cards	−0.67	−1.00	−0.83	−0.33
Charades	−0.67	−0.67	−0.67	+2.73
Anagrams or word building	−1.17	−0.83	−1.51	−0.33
Solve puzzles	+2.02	+1.34	+0.50	+1.17
Checkers	+1.34	+0.17	+0.50	−0.17
Chess	−0.67	−0.33	+2.37	−0.33
Pool	−0.83	−1.00	+0.50	−0.33
Billiards	0.00	−1.00	−0.67	−0.17

As four maturity ratings have been computed for each activity (CB, CG, GB, GG), it was possible to secure the following intercorrelations:

Maturity Indices Based on	Pearson r
Control Boys vs. Gifted Boys	.56 ±.048
Control Girls vs. Gifted Girls	.91 ±.012
Control Boys vs. Control Girls	.58 ±.048
Control Boys vs. Gifted Girls	.59 ±.047
Gifted Boys vs. Gifted Girls	.57 ±.048
Gifted Boys vs. Control Girls	.45 ±.057

These intercorrelations run much as one might expect, except for the lower correlation (.56) between control and gifted boys, as compared with the high correlation (.91) between control and gifted girls.

The norms of maturity indices must of course be based upon the control group. In order to have such norms in a form convenient for use, the maturity indices of Table 156

Table 157.

Maturity Indices of Activities, Control Group

Boys	Girls	
7	13	Roll hoops
13	11	Play jackstones
14	16	Spin tops
13	15	Play jackstraws
13	14	Walk on stilts
13	13	Fly kites
11	14	Play with bow and arrow
16	17	Coast or toboggan
25	18	Ride bicycle
12	13	Skate
15	16	Ski
18	21	Hike
14	11	Do garden work
15	14	Dance
21	14	Shoot
17	14	Fish
18	17	Swim
21	17	Ride horseback
17	16	Row a boat
21	15	Hunt
22	18	Do plain sewing
18	23	Cook a meal
15	23	Knit or crochet
20	15	Use tools
21	16	Work with machinery
7	10	Play tag
11	7	Ring around rosy
11	7	London Bridge
6	6	Farmer in the dell
11	11	In and out window
11	7	Hide and seek
11	5	Hopscotch
9	7	Drop handkerchief
13	10	Blindfold
13	16	Postoffice
6	5	Cat and mouse
13	15	Red Rover
11	9	Puss in corner
11	15	Pom-pom pull-away
15	15	Blackman
14	15	Marbles
14	16	Duck on rock
9	9	Follow leader
14	15	Anty over
14	22	Dare base
10	21	Snap the whip
9	12	Tug of war
12	13	Roly-poly
8	9	Jump the rope
12	9	Leapfrog
14	17	Fox and hounds
12	12	Fox and geese
16	16	Shinny
16	17	Croquet
16	15	Bowling
18	15	Wrestling
19	25	Baseball
16	12	Racing and jumping
13	15	Handball
19	16	Soccer
18	15	Boxing
18	20	Tennis
12	23	Volleyball
19	21	Basketball
18	17	Football
13	1	Play with dolls
13	5	Play "dress up"
9	3	Play house
9	6	Play store
8	6	Play school
12	11	Simon says thumbs up
14	9	Play church
13	15	Dominoes
14	16	Crokinole
13	17	Parchesi
10	14	Tiddledy-winks
14	16	Backgammon
13	17	Authors
11	14	Snap
14	15	Guessing games
12	19	Cards
15	15	History cards
14	16	Geography cards
14	16	Charades
13	16	Word building
19	19	Solve puzzles
17	18	Checkers
14	17	Chess
14	16	Pool
15	16	Billiards

were transmuted into equivalent numerical indices ranging from 1 to 25, by the use of $\frac{x}{\sigma}$ values, as was done in deriving the masculinity indices. These are given in Table 157. In this table, 13 means that the general trend of the curve is neither toward greater or less preference with increasing age. Indices above 13 mean that preference increases with age; indices below 13, that it decreases with age.

Maturity Ratings of Children

The main purpose of the maturity indices of the activities was to serve as a basis for deriving maturity ratings of the individual children with respect to their play interests. The method of securing these ratings was exactly the same as that used in securing masculinity ratings of the children. The distributions, means, and S.D's of the maturity ratings of the children are shown in tables 158 and 159.

The extent to which the means in tables 158 and 159 show significant differences in the maturity ratings of the control and gifted groups, may be seen in Table 160.

The differences may be regarded as significant for the boys at all ages except 13, and for the girls at all ages except 8 and 9.

Figure 26 shows the mean maturity ratings for the gifted and control groups, separately by sex. It will be noted that both gifted boys and gifted girls are considerably more mature in their play interests than are the control groups of corresponding age.

Table 161 shows the per cent of gifted children in various percentile ranges of the control group of corresponding sex. It will be noted that a much larger proportion of the gifted than of the control children make high maturity ratings, especially the gifted boys of 6 to 10 years.

Sociability and Activity Ratings of the Children

It will be recalled that the activities of column 1 are in the main non-social; those of column 2, social and in most cases competitive; those of column 3, mildly social and "quiet." It will be of interest, therefore, to note what proportion of a given child's expressed preferences are in column 2. A high proportion would seem to indicate greater

TABLE 158.

MATURITY RATINGS OF CONTROL AND GIFTED BOYS, BY AGE

Rating	6–7 G	8 C	8 G	9 C	9 G	10 C	10 G	11 C	11 G	12 C	12 G	13 C	13 G	14 C	15–17 C	Total 8–13 C	Total 8–13 G
21										1						1	
20							1			0				2	1	0	1
19							2			0			1	2	0	0	3
18	1		1		1		3	1	3	1	6	4	3	1	8	6	17
17	0		5		3		7	2	12	3	5	8	4	6	9	13	36
16	0		9		9	2	16	7	18	3	15	14	6	12	3	26	73
15	4		10	3	18	5	25	8	22	10	13	12	2	8	8	38	90
14	7	1	12	9	12	17	13	10	14	7	0	4	1	1	1	48	52
13	3	5	2	5	5	3	2	4		3	1		1	1		20	11
12	0	2	1	1	0	2	0			1	1			0		6	2
11	2	1	2	1	1	0	1							1		2	4
10						1	0									1	0
9							1										1
8																	
7																	
6																	
5																	
Total	17	9	42	19	49	30	71	32	69	29	41	42	18	34	30	161	290
Mean	13.94	12.67	14.88	13.63	14.84	13.93	15.42	14.88	15.54	15.07	15.93	15.90	16.33	16.12	16.66	14.73	15.38
S. D.	1.55	0.82	1.53	0.98	1.25	1.15	1.63	1.24	1.12	1.74	1.28	1.11	1.45	1.76	1.38	1.55	1.46

TABLE 159.

MATURITY RATINGS OF CONTROL AND GIFTED GIRLS, BY AGE

Rating	6–7 G	8 C	8 G	9 C	9 G	10 C	10 G	11 C	11 G	12 C	12 G	13 C	13 G	14 C	15–17 C	Total 8–13 C	Total 8–13 G
21											1				1		1
20									1		0			1	1		1
19									0		0	2		2	1	2	0
18									1	2	5	3	2	10	4	5	8
17			1			2	3	3	4	1	6	4	2	9	3	8	16
16			1		1	2	2	0	4	1	6	7	7	8	3	8	21
15	1		0		1	6	6	2	12	3	10	5	3	4	3	12	32
14	0		1	1	2	6	8	7	8	3	10	11	1	4	7	24	30
13	6	3	2	5	8	2	9	9	16	3	3	7	2	9	0	38	40
12	4	4	7	8	13	2	7	4	3	4	1	5		0	0	31	31
11	3	6	6	4	10	1	6	7	2	2		2		0	1	23	24
10	5	2	7	2	4	2	4	1		0				1		7	15
9	1	2	5	5	3		0	2		1						11	8
8	0	3	2	1	2		0									6	4
7	1	1		1			0									2	0
6							1										1
5																	
Total	21	21	32	27	44	23	46	35	51	25	42	46	17	48	24	177	232
Mean	11.43	10.57	11.06	11.07	11.64	11.96	13.00	12.83	14.28	13.56	15.36	14.65	15.71	15.88	16.04	12.76	13.39
S. D.	1.76	1.76	2.01	1.76	1.65	1.90	2.16	1.96	1.76	2.10	1.56	2.05	1.40	2.13	2.28	2.43	2.48

TABLE 160.

SIGNIFICANCE OF MATURITY DIFFERENCES IN TABLES 158 AND 159

Age	Control and Gifted Boys: Diff. between means	Control and Gifted Boys: σ of the diff.	Control and Gifted Boys: Diff. divided by σ	Control and Gifted Girls: Diff. between means	Control and Gifted Girls: σ of the diff.	Control and Gifted Girls: Diff. divided by σ
8	2.21	0.361	6.12	0.49	0.523	0.94
9	1.21	0.287	4.22	0.57	0.420	1.36
10	1.49	0.275	5.42	1.04	0.508	2.05
11	0.66	0.257	2.57	1.45	0.413	3.51
12	0.86	0.380	2.26	1.80	0.484	3.72
13	0.43	0.382	1.13	1.06	0.455	2.33
Total	0.65	0.149	4.29	0.63	0.245	2.57

FIGURE 26.

MEAN MATURITY RATINGS BY AGE, GIFTED AND CONTROL GROUPS

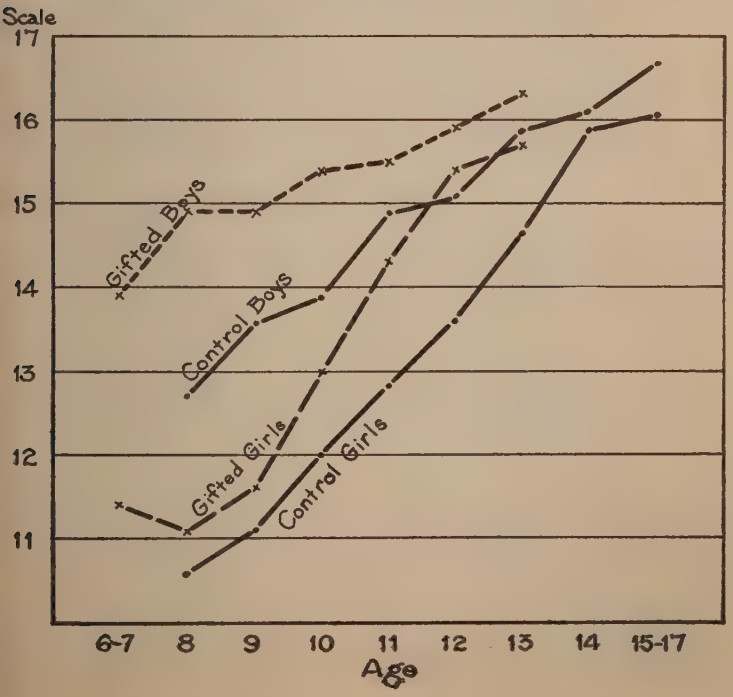


TABLE 161.

PER CENT OF MATURITY RATINGS OF GIFTED CHILDREN IN VARIOUS PERCENTILE RANGES OF CONTROL GROUP

Boys Percentile Ranges of Control Group	Per Cent of Gifted by Age in Each Range						
	6 and 7	8	9	10	11	12	13
Highest 5%	64.7%	88.1%	61.7%	42.2%	16.2%	17.1%	11.1%
Next 20%	5.9%	0.0%	17.0%	40.8%	29.4%	46.3%	33.3%
Middle 50%	17.7%	4.8%	17.0%	11.3%	51.5%	31.7%	44.4%
Next 20%	11.8%	4.8%	4.3%	2.8%	2.9%	4.9%	0.0%
Lowest 5%	0.0%	2.4%	0.0%	2.8%	0.0%	0.0%	11.1%
Girls							
Highest 5%	14.3%	9.4%	11.4%	18.1%	7.8%	7.3%	0.0%
Next 20%	23.8%	15.7%	29.5%	27.3%	47.0%	58.5%	29.4%
Middle 50%	57.1%	68.8%	47.7%	40.9%	41.2%	31.7%	58.8%
Next 20%	4.8%	6.3%	11.4%	11.4%	3.9%	2.4%	11.8%
Lowest 5%	0.0%	0.0%	0.0%	2.3%	0.0%	0.0%	0.0%

sociability; a low proportion, less sociability. Accordingly, for each child the three columns were scored separately, using the method of weighting by one cross, two crosses, and three crosses, described on pages 394–395; then the ratio of score on column 2 to total score on the three columns was calculated and used as a sociability rating of the child. In the same way, the proportion of a child's expressed preferences in column 3 ("quiet" plays) may be used as an activity rating. In this case, the greater the per cent of score on column 3, the less the activity interest.

In deriving both sociability and activity ratings, Exercise 1 was ignored and the scores on exercises 2 and 3 were combined.

Table 162 gives the classification of sociability ratings assigned to the gifted for each age and sex group. It will be noted that from a third to a half of the sociability ratings of the gifted fall below the lower quartile of the control. The difference is large enough to be significant.

Table 163 gives the corresponding data for the activity ratings of the gifted. Here again the gifted show a lower average rating than the control group, indicating that they are more interested in games of the "quiet" type.

Testimony Regarding Experience and Skills. (Exercise 4)

Exercise 4 requires the child to answer 45 questions regarding his experience and skills. These questions, if answered truthfully, would throw considerable light on the degree to which gifted children differ from average children with respect to their experience and interest in wholesome activities. Inasmuch as gross overstatement is possible, and in a certain proportion of cases very probable, the scores on this exercise can not be relied upon for a rating of individual children. They can be used, however, for the comparison of groups, provided the relative tendency of the various groups to overstate is known. This information is available from the Overstatement Test described in Chapter XVII. It is there shown that gifted children of all ages are less inclined than the control group to overstate their knowledge. There is probably little risk in assuming that this tendency holds also for the test with which we are here concerned, and that in consequence any differences found between the gifted and

Table 162.

Sociability Ratings of the Gifted

Per Cent of Gifted by Age and Sex in Indicated Percentile Ranges

Percentile Ranges of Control Group	6 and 7		8		9		10		11		12		13	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Highest 25%	11.8%	4.8%	11.9%	12.5%	4.3%	4.5%	8.4%	13.6%	4.4%	11.8%	26.8%	14.6%	16.7%	17.6%
Middle 50%	41.2%	19.0%	38.1%	34.4%	37.0%	40.9%	57.7%	34.1%	51.5%	41.2%	36.6%	41.5%	33.3%	52.9%
Lowest 25%	47.1%	76.2%	50.0%	53.1%	58.7%	54.5%	33.8%	52.3%	44.1%	47.0%	36.6%	43.9%	50.0%	29.4%

Table 163.

Activity Ratings of the Gifted

Per Cent of Gifted by Age and Sex in Each Range

Percentile Ranges of Control Group	6 and 7		8		9		10		11		12		13	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Highest 25%	17.7%	4.8%	23.8%	6.3%	17.4%	9.1%	12.9%	22.7%	17.7%	23.5%	19.5%	29.3%	17.7%	23.5%
Middle 50%	11.8%	61.9%	50.0%	40.6%	32.6%	45.4%	42.8%	22.7%	35.3%	35.3%	43.9%	26.8%	38.9%	29.4%
Lowest 25%	70.6%	33.3%	26.2%	53.1%	50.0%	45.4%	44.3%	54.5%	47.1%	41.2%	36.6%	43.9%	44.4%	47.0%

control are more unfavorable to the gifted than they ought to be. Table 164 gives the means and S.D's by age, sex, and intelligence, on the basis of 1 point for each question answered by underlining "yes."

TABLE 164.

CLAIMS REGARDING EXPERIENCE AND SKILLS

		6–7	8		9		10		11		12		13		14	15–17
		G	C	G	C	G	C	G	C	G	C	G	C	G	C	C
Boys	Mean	6.8	11.0	12.0	15.8	12.8	15.1	15.6	17.6	15.3	15.6	16.8	19.9	20.2	19.0	18.2
	S. D.	4.8	4.5	5.9	8.2	6.9	7.3	6.9	9.0	6.1	6.5	6.5	5.6	4.8	5.9	5.1
Girls	Mean	8.1	9.6	6.1	8.9	8.7	11.8	9.9	11.2	10.2	12.8	12.9	10.8	10.9	12.0	11.0
	S. D.	5.4	6.6	3.8	6.2	5.6	6.2	4.8	6.6	4.2	6.1	5.1	4.6	3.7	5.1	4.5

From the above data it would seem that gifted children have had, on the whole, about as rich experience along the lines to which these questions relate as the control children have had, possibly richer, if we allow for the greater tendency of control children to overstate in matters of this kind. However, interesting differences were found on individual items when the per cents of affirmative replies were calculated for the control and gifted groups. The largest of these differences are as follows:

Question	Per Cent of Affirmative Replies: Control Boys	Gifted Boys	Control Girls	Gifted Girls
Did you ever shoot any game?	54	31	17	7
Have you ever set up electrical apparatus?	19	39	—	—
Can you read the time from a sun dial?	28	58	15	42
Have you ever hiked eight miles in a day?	51	69	34	47
Have you ever milked a cow?	57	27	29	17
Have you ever hitched up a horse?	52	27	28	10
Have you ever been elected to any office or special honor?	21	53	18	53
Have you ever been captain of an athletic team?	24	34	15	21

Exercises 5, 6, and 7. (Play Information)

Exercises 5, 6, and 7 (see page 390 ff) are tests of play information and relate chiefly, though not entirely, to the 90 activities of exercises 1, 2, and 3. The score in each exercise is the number of correct responses minus half the number of wrong responses; that is, score $R - \frac{1}{2} W$. This formula allows for the factor of chance success from guessing. In order to increase the reliability of results, the scores on the three exercises were combined into a total score. Means and S.D's of the control and gifted groups by age and sex are given in Table 165.

Table 165.

Means and S.D's for Play Information by Age, Sex, and Intelligence

		6–7		8		9		10		11	
		C	G	C	G	C	G	C	G	C	G
Boys	Mean	15.3		14.8	32.5	17.8	49.8	22.7	58.0	35.6	70.1
	S. D.	11.2		5.8	15.0	11.7	15.5	15.6	15.3	21.3	13.5
Girls	Mean	15.6		8.0	23.6	13.3	33.1	18.3	44.3	31.3	53.5
	S. D.	8.5		4.4	11.4	9.5	14.6	9.1	15.4	15.4	15.1

		12		13		14	15–17
		C	G	C	G	C	C
Boys	Mean	46.1	77.3	50.0	83.7	50.7	32.4
	S. D.	19.3	11.7	26.9	8.0	23.7	24.8
Girls	Mean	33.8	62.6	49.1	71.7	42.9	38.3
	S. D.	16.4	12.5	18.7	12.0	19.8	14.3

The age means for the control boys were smoothed and used as norms for calculating the information quotients of the individual gifted boys, just as intelligence quotients are calculated. As the sex differences are very large, a separate norm was derived for the girls. Table 166 shows the distribution of play information quotients for the gifted children.

The mean quotient of 136.8 shows that gifted children, age for age, possess enormously more information about plays, games, and amusements than do unselected children. In fact, their superiority in play information is almost as marked as their superiority in the Stanford Achievement

Tests. It is of course unsafe to draw any inferences regarding play habits from data on play knowledge, but it is interesting to know that whatever the play habits of the gifted may be, such children are at any rate not lacking in play information. The results here lend greater credence to the data from exercises 1, 2, 3, and 4.

TABLE 166.

PLAY INFORMATION QUOTIENTS OF GIFTED CHILDREN

Quotient	Gifted Boys N	Gifted Boys Per Cent	Gifted Girls N	Gifted Girls Per Cent	Total, Gifted N	Total, Gifted Per Cent
190–200			1	0.4 %	1	0.2 %
180–190			4	1.6 %	4	0.7 %
170–180	12	3.9 %	4	1.6 %	16	2.9 %
160–170	32	10.5 %	13	5.2 %	45	8.1 %
150–160	51	16.7 %	31	12.3 %	82	14.8 %
140–150	62	20.3 %	39	15.5 %	101	18.2 %
130–140	51	16.7 %	60	23.9 %	111	19.9 %
120–130	51	16.7 %	46	18.3 %	97	17.5 %
110–120	29	9.5 %	29	11.5 %	58	10.3 %
100–110	11	3.6 %	14	5.8 %	25	4.5 %
90–100	3	1.0 %	9	3.6 %	12	2.2 %
80– 90	1	0.3 %	1	0.4 %	2	0.4 %
70– 80	2	0.7 %			2	0.4 %
Total	305		251	100 %	556	
Mean		138.99%		134.3 %		136.87%
S. D.		18.15%		19.32%		19.24%

It was originally intended that the play information scores should also be used as a check against the child's honesty of report in exercises 1, 2, and 3. This task was abandoned, partly because it was too laborious, but chiefly for the reason that the relatively small number of activities marked by many children in exercises 1, 2, and 3 make the check very unreliable.

HOME AND SCHOOL DATA ON PLAY LIFE

In addition to the data secured by the use of the questionnaire-test, considerable supplementary information on play life was furnished by the Home and School Information Blanks. In each certain questions were asked regarding the amount of time spent in play, age and sex of companions preferred, attitude toward and popularity with other chil-

dren, etc. In most cases a graded rating was called for, on the same general plan, in both home and school reports. In the case of the gifted children it is therefore usually possible to check one report against the other.

Home and School Blanks were not filled out for the control group which was given the questionnaire-test on plays, games, and amusements. However, as stated on page 177 ff, School Information Blanks were filled out by teachers for a control group of approximately 600 children in Los Angeles, San Francisco, and Oakland. (Control Group A.) It will be recalled that these children were selected to represent as nearly as possible the average school child in the cities, schools, and neighborhoods from which the gifted children came.

Since this group of control children does not go below age 8, wherever age affects the results the comparison is somewhat unfair to the gifted. The reports were all tabulated by age, but as there was little evidence of age influence on most of the questions reported upon, the ages have ordinarily been combined in the summaries given in the following pages. The proportion in each group for whom reports were received will be stated in each case. Unless otherwise stated, the tabulated results are in terms of per cents *for whom the given question was answered.*

Does child play with other children very much, average amount, little? Underline. School Blank: IV, 10. Answered for 91 per cent of CB, 93 per cent of GB, 92 per cent of CG, and 89 per cent of GG.

	Very much	Average amount	Little
Control Boys	33%	55%	12%
Gifted Boys	20%	64%	16%
Control Girls	33%	57%	10%
Gifted Girls	24%	64%	12%

These figures indicate that the gifted child plays alone somewhat more than do normal children similarly situated. The difference, however, is small.

Average hours a week spent with other children during the last year (out of school). Home Blank: II, 29. Answered for 86 per cent of boys and 89 per cent of girls.

	Average Hours a Week					
	35 or more	28 to 35	21 to 28	14 to 21	7 to 14	0 to 7
Gifted Boys	9%	12%	23%	20%	28%	8%
Gifted Girls	8%	7%	16%	25%	34%	10%

Comparable data are not available for the control group, but the average of about two and three-quarter hours a day for gifted boys and two and a quarter hours a day for gifted girls, spent in play with other children out of school, would not seem to be a bad record.

Prefers playmates who are much older, older, same age, younger, much younger. School Blank: IV, 11. Home Blank: II, 30. Home reports for 91 per cent of gifted; school reports for 87 per cent of gifted and 90 per cent of control. As no significant sex differences were found, the sexes were combined.

	Much older	Older	Same age	Younger	Much younger
School Blank: Control	1.2%	7.9%	86.5%	3.8%	0.6%
" " Gifted	4.3%	20.8%	70.8%	3.3%	0.8%
Home Blank: Gifted	4.2%	30.4%	61.2%	4.0%	0.2%

The school reports a much larger percentage of gifted than control children who prefer older playmates, and the home reports for the gifted agree fairly well with those from the school. This is probably due in part to the fact that the gifted child is usually associated in school with children a year or two older than himself, and in part to a tendency for mental ages to seek their level.

Prefers playmates of the same sex, opposite sex, or no preference. Underline. School Blank: IV, 12. Home Blank: II: 32. Home reports for 98 per cent of gifted; school reports for 89 per cent of gifted and 91 per cent of control.

	Boys			Girls		
	Same	Opposite	No Pref.	Same	Opposite	No Pref.
Control: school report	79%	4%	17%	75%	5%	20%
Gifted: school report	76%	1%	23%	65%	2%	33%
Gifted: home report	67%	3%	30%	54%	3%	43%

The significant difference here between the control and gifted is the much less marked tendency of the gifted to

make sex distinctions. This is especially noticeable in the case of the gifted girls, and is in harmony with the fact that the masculinity ratings based on play interests were higher for gifted than for control girls. Home and school agree in reporting the girls (both gifted and control) considerably more tardy than boys in developing a preference with regard to sex of playmates. This is shown in the following per cents reported as having "no preference" at various ages:

No Preference for Sex of Playmate

	Age 2–7	Age 8–10	Age 10–12	Age 12–14	Age 14–15
School Blank: Control Boys	—	29%	11%	11%	14%
" " " Girls	—	20%	22%	20%	18%
" " Gifted Boys	30%	23%	20%	24%	—
" " " Girls	35%	25%	29%	34%	—
Home Blank: Gifted Boys	60%	29%	21%	19%	—
" " " Girls	35%	37%	42%	54%	—

Reading the above figures from left to right it is seen that for girls the absence of any sex preference is more common at 12-14 than at 8-10, and that the reverse holds for the boys.

Is child's companionship especially sought, rather avoided, neither? Underline. School Blank: IV, 13. Answers were received for 91 per cent of both groups.

	Boys			Girls		
	Especially sought	Rather avoided	Neither	Especially sought	Rather avoided	Neither
Control	32%	3%	65%	38%	3%	59%
Gifted	29%	5%	66%	37%	4%	59%

The figures for control and gifted agree fairly closely; more girls than boys in each group are said to be especially sought for companionship. This finding is supported to some extent by the trait ratings presented in Chapter XVIII. The following questions also throw some light on popularity and social adaptability. The following figures for three different age levels show that with both gifted and control the per cent of children "rather avoided" decreases after 11 years:

	Ages 8 and 9	Ages 10 and 11	Ages 12 and 13
Control Boys	5%	4%	0
Control Girls	1%	4%	0
Gifted Boys	7%	7%	2%
Gifted Girls	1%	5%	4%

When can't have his way, cries or gets angry often, occasionally, rarely. Underline. School Blank: IV, 14. Answered for 81 per cent of gifted and 82 per cent of control.

	Boys			Girls		
	Often	Occasionally	Rarely	Often	Occasionally	Rarely
Control	5%	21%	74%	6%	12%	82%
Gifted	7%	14%	79%	4%	14%	82%

The differences here are too small to have any significance.

Is teased by others very frequently, frequently, occasionally, rarely, never. Underline. School Blank: IV, 15. Home Blank: II, 34. School reports for 88 per cent of both groups; home reports for 95 per cent of gifted.

Boys		Very Frequently	Frequently	Occasionally	Rarely	Never
School Blank:	CB	0%	6%	19%	46%	29%
School Blank:	GB	3%	4%	21%	30%	42%
Home Blank:	GB	3%	8%	34%	38%	17%
Girls						
School Blank:	CG	1%	7%	18%	34%	40%
School Blank:	GG	1%	4%	12%	36%	47%
Home Blank:	GG	3%	8%	31%	37%	21%

The above figures do not show any consistent trends, except that teachers more often than parents report children as never teased. There is no evidence from these reports that gifted children tend more often than others to be socially maladjusted. The proportion "rarely" or "never" teased remained in all groups practically constant for all ages, the gifted girls running higher than control girls, and the gifted boys somewhat lower than the control boys.

Is child considered by others as "queer" or different? If so, in what way? Home Blank: II, 35. School Blank: IV, 16. Home reports were received for 89 per cent of gifted boys and for 92 per cent of gifted girls; school reports for 84 per cent of control boys, and 87 per cent of control girls, 89 per cent of gifted boys, and 83 per cent of gifted girls.

	Boys		Girls	
	No	Yes	No	Yes
School Blank: Control	95%	5%	95%	5%
" " Gifted	88%	12%	93%	7%
Home Blank: Gifted	90%	10%	92%	8%

This would indicate that gifted children somewhat more often than control children are considered "queer" or different, although the absolute number is not large. There is close agreement of the reports from home and school on the gifted group. The question, *in what way?* brought the following explanations of the adjustment difficulties found in the gifted group:

	Home Blank		School Blank	
	Boys	Girls	Boys	Girls
Number of cases reported	20	30	16	33
No explanation given	2	3	2	1
"Considered remarkable," "brighter," "knows more"	6	10	7	8
Acts more mature, "old acting"	4		1	1
Serious conduct	1			
Would rather read than play	1	2	2	4
Talkative	1			
Domineering	1	2	1	1
Independent	1			
Conceited, "aloof"	3			3
Lacks physical courage		1		
Quiet, too refined, (boys call him "sissy")				
Doesn't care for outdoor games		4		4
Not rough acting		2		1
Physical disabilities prevent participation in games		1		1
"So sensitive"			1	
Dramatizes everything			1	
Original—hates sameness			1	
Japanese				2
Dislikes other children—no chums				2
Quarrelsome and antagonistic				1
Babyish (plays in school)				1
Fat and clumsy				1
"Doesn't fit in"				1

One cannot assume that the reasons given are always the true ones, although the agreement between the home and school reports suggests that general tendencies may be revealed. If so, it is probable that in a majority of cases the difficulty is not serious enough to endanger greatly the child's future. Less than half the explanations mention traits that are seriously unfavorable.

Prefers to play indoors, outdoors, or no preference. Underline. Home Blank: II, 33. Answered for 97 per cent.

	Boys			Girls		
	Outdoors	Indoors	No Pref.	Outdoors	Indoors	No Pref.
Gifted	63%	5%	32%	53%	8%	39%

We have no control data on this question, but the results are about what one might expect from children in general; 5 per cent of boys and 8 per cent of girls prefer indoor play. No age differences were noted.

Are play interests normal? If not, explain. School Blank: IV, 17. Answered for 93 per cent of gifted and 95 per cent of the control.

	Boys		Girls	
	Yes	No	Yes	No
School Blank: Control	95%	5%	95%	5%
School Blank: Gifted	90%	10%	97%	3%

Gifted boys are slightly more often abnormal in their play interests than control boys, according to these figures. Explanation of these "abnormalities" was given for the gifted children as follows:

	Girls	Boys
Number of cases reported	9	32
No explanation given	–	2
"Prefers reading to play"	2	14
"Does not want to play"	4	9
"Not interested in games"	1	5
"Reserved," "bashful"	1	1
"Prefers one or two companions"	1	–
"Plays constantly with one little girl"	–	1

Has child had imaginary playmates? . . . Imaginary countries? Home Blank: II, 31. Imaginary playmates were reported as follows:

	Have Imaginary Playmates	
	Girls	Boys
Number of cases reported	85	51
No information given	24	8
Definite personality	27	13
Rather indefinite, but probable	3	1
Fairies	4	1
Imaginary animals, birds, etc.	1	3
"Air friends"	–	1
"Makes up stories, incl. imaginary playmates"	1	–
"Not often," "a few," "for short time"	4	1
Imaginary opponent in games	1	6
Assumes rôles of characters in books	12	11
Conversation with imaginary persons	8	7
"Idealizes play animals and pillows"	–	1

A good many of these reports seem to be due to a misinterpretation of the question, but it is probable that a fairly large proportion of the gifted children have had imaginary playmates. The information on these is rather meagre, but includes such statements as the following:

"At the age of two, 'Don' and 'Gaul'. Very vivid."

"From the age of twenty months to three years he played with imaginary animals. He loved them dearly and was never afraid."

"At the age of two and three, 'Dibby,' who was blamed for his naughtiness."

"A weaker boy who could be ordered around."

" 'Oliver' and 'Stuart,' who played, ate, and slept with him. Very real."

"Mr. and Mrs. Moon, Baby Moon, and their cook. Mrs. Cardboard. She talks about them continually, and likes to take Baby Moon along when we go out." (A 3-year-old girl.)

"Between the ages of three and four, 'Evelyn,' who did all the naughty things, but had to be petted."

"Between the ages of three and five, Tin Can family of relatives. They came to see us, and she visited them."

"Several, each named and never confused."

"When three to five years old she used to say, 'Don't sit in that chair. Iris sits there.' "

In the instances in which dates were given the imaginary playmates seem to have flourished when the children were from 2 to 5 years of age, many of them lasting through the whole period. There is some indication, too, that they occur more frequently in cases where the child has no real playmates.

The list of imaginary countries is summarized as follows:

	Have Imaginary Countries	
	Girls	Boys
Number of cases reported	25	23
"Wonderful places he has visited"	–	1
"Kyienien" Hills	–	1
Travel in general	1	5
Fairy countries	3	2
Oz Book type	–	2
Foreign countries (travel)	2	1
"The Mountains"	1	–

	Have Imaginary Countries	
	Girls	Boys
"Sailing in a Norwegian ship"	–	1
"Imaginary playmate, located variously"	–	1
"All sorts of places"	2	2
"Fond of mythology"	1	–
"The last book he has read"	–	1
"Where you can do everything you want, be successful in everything, see nice people, beautiful rivers, etc."	1	–
No information given	14	4

Summary

1. Preference ratings were assigned to 90 plays, games, and amusements, based on the extent to which gifted and unselected children say they like and practice them. Four such ratings, based, respectively, on control boys, control girls, gifted boys, and gifted girls, were derived. The intercorrelations of the ratings for these four groups were computed and found very high in each intelligence group (above .80) for like-sex groups, and very low (.18 to .35) for unlike-sex groups.

2. The gifted children show measurably greater interest than the control in activities that require thinking and that are mildly social and quiet. They show slightly less preference than do the control group for competitive games.

3. The sex differences in preferences expressed by the control group were made the basis of "masculinity indices" of the activities. This made possible the calculation of a "masculinity rating" for each child, based on the total masculinity values of the activities for which his preferences were expressed.

4. The mean masculinity ratings of the gifted boys were slightly higher than those of control boys at all ages except 13. The means of the gifted girls did not differ consistently from those of control girls.

5. "Maturity indices" of the 90 activities were computed, based on the angle of their respective age curves of preference ratings. Four such indices were derived for each activity, based, respectively, upon control boys, control girls, gifted boys, and gifted girls. Intercorrelations of these ma-

turity indices for the four groups ranged from .45 to .59, except for control girls vs. gifted girls, for which $r.=.91$.

6. "Maturity ratings" of the children were then derived, based on the maturity indices possessed by the activities for which they had expressed preference. These ratings are consistently higher for gifted than for control children. This means that, in general, gifted children tend to prefer activities which, among control children, show *increasing* rather than *decreasing* popularity for the ages 8 to 14.

7. A "sociability rating" was derived for each child, based on the proportion of preferences which fell to social and competitive games. This tended to run somewhat lower for gifted than for control children.

8. In the same way an "activity rating" was derived for each child, based on the proportion of preferences which fell to the quiet activities. These ratings were lower for girls than for boys, and also lower for the gifted than for the control group.

9. Testimony regarding 45 items of "experience" shows little difference between gifted and control in amount of such experience, but considerable difference in kind. The gifted have had much more experience along lines that involve intellectual activity.

10. A play information test of 143 items was given to gifted and control groups. Norms were established and play information quotients were computed for the sexes separately. The mean play information quotient of the gifted was 136. Girls scored somewhat lower than boys on this test.

11. Additional data on play life were secured both from home and school for the gifted, and from the school for a control group.

12. The gifted children play alone slightly more than do the control. However, the average gifted boy spends about two and three-quarter hours a day with other children (out of school), and the gifted girl about two and a quarter hours.

13. Gifted children, oftener than control, prefer playmates who are older than themselves.

14. The gifted show much less sex preference than do control children in choice of playmates, and girls show far less sex preference than do boys.

15. The gifted child's companionship is sought in school to about the same extent as that of the control child, although the gifted child is usually considerably younger than his classmates.

16. There is little difference in the extent to which gifted and control children are teased by others or cry when they cannot have their way. However, somewhat more gifted than control are said to be regarded by other children as "queer" or "different."

17. The play interests of gifted boys are somewhat more often said not to be normal than is the case with control boys. The reverse, however, holds for the girls.

18. A good many gifted children have had imaginary playmates or imaginary countries, but comparative data on this point are not available for unselected children.

CHAPTER XV

READING INTERESTS[1]

The data of this chapter are based upon (1) answers given by parents, teachers, and the children themselves to certain questions in the Home Blank, School Blank, and Interest Blank, and (2) records kept by the children of the books which they read during a period of two months. Considerable information was obtained for unselected children, especially by means of reading records. The reading of any group of children is so widely scattered that several thousand cases are usually necessary to establish many reliable differences in reading preferences. As our groups are relatively small, it is possible in most cases only to indicate general trends. With regard to the amount and general type of reading, however, the results are fairly conclusive. An extended treatment of the data elsewhere makes it unnecessary to give here more than a brief summary.[2]

Amount of Reading as Estimated by Parents

In the Home Blank parents were asked to indicate the kind and amount of home reading at the following ages: before 5, 5 and 6, 7 and 8, 9 and 10, 11 and 12, 13 or above. It was specified that the amount was to be given in terms of hours per week, and that reading on school work should not be included. Probably because of the difficulty of answering the question, about 30 per cent of parents failed to respond and some who did respond gave data for only a part of the ages. Allowance must be made for a large amount of error in such reports. Children reported as having been accustomed to read 12 hours, 18 hours, or 25 hours a week at the age 6 years may have read more or less than these amounts, but the fact that parents report many such histories is at least interesting evidence. The figures reported are summarized in Table 167.

[1]Written with the assistance of Margaret Lima.

[2]Lewis M. Terman and Margaret Lima: *Children's Reading; A Guide for Parents and Teachers.* Appleton, 1925.

TABLE 167.

HOURS OF READING PER WEEK AT VARIOUS AGES (PARENTS' ESTIMATES)

Hours Weekly	Before 5		5 and 6		7 and 8		9 and 10		11 and 12		13 or ov	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Gi
0	279	207	174	118	23	20						
1	6	3	7	7	2	8	2	1		2		
2	16	19	15	9	9	11	5	10	3	5	1	
3	11	18	24	21	17	35	9	7		9		1
4	6	5	16	35	22	34	22	23	6	8		
5	4		25	24	11	26	17	8	9	6	5	
6	4	2	14	13	15	25	12	20	5	5	3	
7	13	7	14	13	26	17	11	13	3	6		1
8	3		6	2	19	13	17	11	3	2		1
9			2		4	8	10	3	2	10		1
10		4	12	7	33	19	19	18	11	1	10	
11	1		3	1	1	5	3		1	5		
12		2		2	1	7	10	6	1	1		2
13					1	1				1		
14			7	4	10	10	17	6	4	1		
15			2	1	2	3	8	7	5	1	2	
16							1	1	3	1		
17							1			2		
18	1		3		3			1	3			
19										4		
20	2	2	1		9	2	8	5	5	3		2
21				1	3	2		3			3	
22						1						
23							1			2		
24								1		1		
25 or over	1		2	1		2	7	1	2	1	1	1
Total Reports	348	269	327	259	210	249	183	145	66	77	25	9
Median	0	0	0	1.5	6.73	5.13	8.35	6.77	9.68	8.08	10.5	11.
Mean	1.06	1.04	2.90	2.9	7.2	6.16	9.6	8.29	10.44	9.97	12.5	12.
S. D.	3.06	2.6	4.32	3.8	5.5	4.7	5.8	5.6	6.0	6.9	7.3	6.

According to parents' reports a good many gifted children read as much as seven hours a week before the age of 5 years; by age 7 the average amount is six or seven hours a week and by age 13, twelve hours. The amount reported for boys is slightly higher than that for girls from 7 to 12 years. The standard deviations are, however, extremely high. In cases where the amount of reading seemed impossibly high, all the available information regarding the child was sifted. For example, one boy was reported as reading twenty-five hours a week before the age of 5. Other information in our files showed that this boy learned to read before the age of 3 years and that before 5 he was reading almost anything he could lay hands on. In every case of this kind the supplementary information lent credence to the parent's report.

Amount of Reading as Estimated by Teachers

In the School Blank teachers were asked to answer the following question: *As compared with the average child of the same age, does this child read (1) very much, (2) more than average, (3) average amount, (4) less than average, (5) very little?* In this case comparative data are available for the Control Group A. (See pages 177–178 for description of this control group.) Table 168 summarized the responses to above question. Ages were first tabulated separately, but since the comparison took age into account, the figures remained almost constant from age to age and it is necessary to give here only the results for the ages combined. As the control group did not go much below age 8 years, or the gifted group much above 13 years, the figures for each group are here presented only for children of ages 8 to 13. This gives a total of 429 gifted and 401 control children.

Table 168.

Teachers' Estimates of Amount of Reading

	Gifted Boys	Gifted Girls	Total Gifted	Control Boys	Control Girls	Total Control
1. Very much	132	99	231	19	27	46
2. More than average	86	61	147	51	37	88
3. Average amount	24	27	51	88	89	177
4. Less than average	0	0	0	31	24	55
5. Very little	0	0	0	22	11	33
Total cases	242	187	429	211	188	399
Mean amount	1.55	1.61	1.58	2.94	2.76	2.85
Standard deviation	0.67	0.73	0.69	1.08	1.04	1.06
Read more than "average"	90%	86%	88%	33%	34%	34%
Read less than "average"	0%	0%	0%	25%	19%	22%

The differences between the gifted and the control group are very striking. Of the 429 gifted, 88 per cent are rated as reading more than the average, while the distribution of ratings for the control group is fairly symmetrical around "average" as the mode. The sex differences are too small to be significant.

Records of Two Months Reading

The most reliable data on amount of reading were furnished by the children themselves in the form of records which they were asked to keep of the books read over a period of two months. Similar records were kept by a control group. (Control Group C.) Each child was given a 32-page record booklet, size 3 x 5 inches. The first three pages were as follows:

Reading Record

Name of pupil ..... Age .....

Name of parent .....

Address .....

Date when record was begun ..... Month Day Year

Date when record was finished ..... Month Day Year

As soon as record is finished, mail this book to Professor Lewis M. Terman, Stanford University, California.

(Read the instructions on the inside carefully.)

WHY YOU ARE ASKED TO KEEP THIS RECORD

I wish to find out what books children of each age like best, and in order to get the facts I am asking several hundred boys and girls to help me by keeping a record in this note book of all the books they read during a period of *two months.*

When the note books have been returned to me I shall then be able to prepare and publish a *"List of Best-Liked Books,"* which will be of great help to parents and teachers in selecting the books children of each age really enjoy most. By keeping this record you will therefore be doing something that will help to make the lives of thousands of children happier.

Lewis M. Terman.

HOW TO KEEP THE RECORD

1. For *two months* make a record of *all* the books you read, but do *not* include your regular school textbooks or books that some one else read to you.

2. While keeping the record, you should read just your usual amount. Do not make a special effort to turn in a long list. For the present purpose it does not matter whether you read many or few.

3. Make your record for each book on the day you finish reading it. Do not wait till the end of the week or the end of the month, for you might not then be able to remember all.

4. Make your records neat and answer all the questions about each book.

5. When you have recorded your reading for *two months*, mail this note book to *Professor Lewis M. Terman, Stanford University, California.*

Then followed 29 pages, each as follows:

1. Title of book.....

Name of author.....

Date when you finished it, if you did finish it: Month.....Day.....

If you did not finish it, tell why.....

Below, make a cross before the statement that tells how well you liked it. (Give your real opinion, no difference what others think about the book.)

_____"One of the best I ever read."

_____"Liked it very well,—better than most books."

_____"Liked it fairly well."

_____"Did not care much for it."

_____"Did not like it at all."

Had you ever read this book before?.....

How many times before this time? .....

Do you think you will want to read it again?.....

The booklets were distributed to the gifted group in May, 1922. In most cases the first month of the record came within the school session, the second month within the summer vacation. Many parents, when returning the booklets, wrote that the amount read was less than usual during the vacation, but it is possible that with others the reverse was the case.

It was not originally planned to secure reading records for a control group, and when this was later decided upon it was not possible to begin the records until after the opening of the following school year. Booklets were distributed to Control Group C about October 1st, and the records cover in most cases the months of October and November. We do not know to what extent this discrepancy in time affected the results, or in what direction. One might suppose, however, that it would favor the control group, as the gifted children received their booklets at a time when the pressure of school work is likely to be greatest.

Control Group C, for which reading records were obtained, was a special group not used in any other connection. It consisted of about 1,000 children from grades 2 to 8, inclusive, in Palo Alto, Redwood City, and Menlo Park, California. In the case of the control group the booklets were distributed and collected through the teachers. Each teacher assured her pupils that she would not examine their records and urged them to record *all* the books they read,

with the exception of school texts. It is not likely, of course, that the children recorded their clandestine reading. If there was any difference between the gifted and control group in this respect it is probable that the reports of the gifted were less complete, as no effort was made to prevent parents of the gifted from inspecting the records of their children.

Of approximately 600 children in the main experimental group who were asked to coöperate, 511 returned the record booklets in time for tabulation of results. The control group of approximately 1,000 children supplied 808 records. Table 169 gives the average number of books read by both groups at ages 6 and 7 combined, 8 and 9, 10 and 11, etc.

TABLE 169.

AVERAGE NUMBER OF BOOKS READ IN TWO MONTHS, GIFTED AND CONTROL GROUPS

	Boys				Girls			
	Gifted		Control		Gifted		Control	
Ages	Cases	Av. No. Books	Cases	Av. No. Books	Cases	Av. No. Books	Cases	Av. No. Books
6 and 7	16	9.3	17	0	13	11.5	15	0
8 and 9	70	12.4	90	4.6	72	15.2	73	5.6
10 and 11	123	14.7	139	7.3	92	15.6	147	8.7
12 and 13	63	12.8	101	5.8	62	16.5	129	7.7
14 and 15			56	7.5			41	9.3
Total	272		403		239		405	

Table 169 shows a large difference between the two groups. The gifted child of 7 years reads on the average more books than the unselected child reads at any age up to 15. One cannot say how many more pages they read, for the books they read are probably shorter than those read by older children. Gifted children of 8 and 9 read nearly three times as many books as unselected children of the same age, and above 10 approximately twice as many. By the age of 8-9 years the gifted have almost attained their maximum.

In both groups there is a significant sex difference. Girls surpass boys by the following per cents in the number of books read at the different ages:

	Gifted Group	Control Group
8–9	23%	22%
10–11	6%	19%
12–13	29%	32%
14–15	—	24%

It is a little surprising to find that in both groups boys reach their maximum earlier than girls. This may be due to the fact that older boys are more likely to develop hobbies, such as outdoor sports, collections, mechanical pursuits, etc. Girls, lacking these diversions, naturally turn to books.

An interesting fact not shown in Table 169 is that so many of the control group read no books at all during the two-months period. Of those 8 years old or older for whom booklets were returned, 13 per cent reported that no books were read. The proportion was doubtless much higher among the 20 per cent whose booklets were not returned. In the gifted group not a single child of 8 years or older who returned the booklet, reported fewer than two books read.

Influence of Intelligence on Type and Range of Reading

General intelligence influences not only the amount of reading but also its quality and range. Comparative study of the two-months reading records of our gifted and control groups shows that the gifted read over a considerably wider range and that they read far more non-fiction and informational material. On the whole, however, the most striking contrast is less in the type of books read than in the age at which they were read. A book that is well liked by an average child of 11 or 12 is often read with enjoyment by the gifted child of 8 or 9. Table 170 shows for boys and girls of each group the per cent of books read belonging to various types.

Table 170.

Classification of Books Read by Gifted and Control Groups

	Per Cent of Books Read Belonging to Each Type			
	Gifted Boys	Control Boys	Gifted Girls	Control Girls
Fairy tales, folk tales and legends	8%	5%	12%	5%
Nature and animal stories	9%	4%	6%	6%
History, biography, and travel	6%	3%	6%	2%
Science	4%	0.5%	1%	0.2%
Stories of adventure or mystery (mostly boys' juveniles and series books)	49%	63%	15%	22%
Stories of home and school life (mostly girls' books)	2%	3%	31%	33%
Poetry and drama	1%	0.1%	1%	0.1%

	Per Cent of Books Read Belonging to Each Type			
	Gifted Boys	Control Boys	Gifted Girls	Control Girls
Children's encyclopedias	1%	0.1%	1%	0.1%
Informational fiction, including the classics	19%	11%	14%	9%
Emotional fiction (the popular novel and love story)	1%	6%	11%	19%

It will be noted that the above table tells nothing about the relative amount of reading done by the gifted as compared with unselected children. It tells merely what proportion of the reading actually done by each group belongs to each type of literature. For example, of the books read by the gifted boys, 8 per cent belong to the class "fairy stories, folk tales, and legends"; 9 per cent to "nature and animal stories," etc.

Certain differences stand out very clearly. A larger proportion of the books read by gifted boys than of those read by control boys fall in the field of science, history, biography, travel, folk tales, nature and animal stories, informational fiction, poetry, drama, and encyclopedias; a smaller proportion in the fields of emotional fiction and stories of adventure and mystery. Almost exactly the same differences are found between gifted and control girls, except that here the two intelligence groups show about the same degree of preference for nature and animal stories. The differences indicate that the reading of the gifted is of a better average quality than that of the control group.

Sex Differences in Reading Interests

In the reading interests of very young children sex differences are not noticeable. By the age of 9 or 10 the boy begins to turn from fairy tales and fantastic stories to books of a more realistic nature, while the girl clings more to the imaginative story. By 11 or 12 the divergence is very marked, and the breach continues to widen up to adult life, when a certain amount of *rapprochement* takes place.

Girls are more homogeneous with respect to reading tastes than are boys. Boys scatter their reading over a wider range. For example, *Little Women* is universally popular among girls, but we find no one book that has so wide a distribution among boys. This difference was also evident

in the responses which a hundred graduate students, fifty men and fifty women, gave when asked to name the ten books read in childhood which most appealed to them. Of the women, 50 per cent listed *Little Women,* 36 per cent the *Little Colonel* books, 30 per cent *Robinson Crusoe,* and 25 per cent *Black Beauty.* There were very few books not named by three or more women. The men's list showed variety. *Robinson Crusoe,* which appeared most frequently, was mentioned by only 13 per cent. *Treasure Island* came next with 12 per cent, and third, *The Last of the Mohicans* with 8 per cent.

The narrower range of girls' interests is also indicated by their tendency to re-read books. In the reading record booklet the child was asked to state, regarding each book recorded, whether he had ever read it before. The gifted and control children combined reported more than twelve thousand readings. Of the books recorded by girls, 30 per cent represented re-readings; of those recorded by boys, 18 per cent.

Classifying the gifted and control by sex, we have the following classification of readings reported in the record booklets:

TABLE 171.

CLASSIFICATION OF READING BY SEX

	Per Cent of Books Read Falling in Each Group	
	Boys	Girls
Fairy tales, folk tales, and legends	7%	10%
Nature and animal stories	7%	6%
History, biography, and travel	5%	4%
Science	3%	1%
Stories of adventure or mystery (mostly boys' juveniles and series books)	56%	18%
Stories of home and school life (mostly girls' books)	2.5%	32%
Poetry and drama	0.4%	1%
Children's encyclopedias	0.5%	0.4%
Informational fiction, including the classics	15%	11%
Emotional fiction (the popular novel and love story)	3.5%	16%

The above figures reveal three outstanding contrasts. As compared with boys, girls read (relatively to total amount read) (1) more than twelve times as many books of home and school life; (2) nearly five times as much emo-

tional fiction; and (3) only a third as many stories of adventure or mystery. Girls care more than boys for fairy stories, and boys more than girls for books of science, history, biography, travel, and informational fiction. When romance enters into a boy's book it must be so intermingled with action that the sentiment is not too obtrusive. The strong human interest in girls is shown by their intense liking for books of the *Little Women* type.

To what extent the sex differences in reading interests reflect differences in native endowment, and to what extent the subtle effects of social ideals and training, it is impossible to say. It is the tradition of our race that men should be interested in such things as industries, machinery, and the sciences, and that woman's sphere is the home. The girl is exposed to this tradition from her earliest years, and it would be surprising if such long-continued and pervading suggestion did not leave its mark on her reading interests.

It is worthy of note, however, that although boys show practically no interest in girls' books, girls show a most decided interest in boys' books. Girls read with interest *Treasure Island, The Call of the Wild,* and other popularly accepted boys' books. They read the Boy Scout books and other boy adventure series. Few boys, however, read *Little Women* or *Rebecca of Sunnybrook Farm,* and they rarely open a girls' book on stories of school life. From the reading records of our children it was found that 18 per cent of the girls' reading was in the field of boys' books, but only 2 per cent of the boys' reading was the human interest story of home or school life that girls so much enjoy.

Preference Ratings of Books Read

It will be recalled that the record booklet requested the child to rate each book read by checking one of the following statements:

.....One of the best I ever read.
.....Liked it very well,—better than most books.
.....Liked it fairly well.
.....Did not care much for it.
.....Did not like it at all.

This request was complied with in nearly all cases. It was hoped that the results would be worth summarizing for

the individual books recorded, but, as it turned out, the reading covered such a wide range that the number of ratings for a given book was in most cases too small to warrant the computation of average ratings for individual books. However, ratings were distributed and averaged for the books of each general class. The averages are shown in Table 172 for the gifted and control groups. In computing averages the five degrees of preference were assigned the values 1, 2, 3, 4, 5, in order from greatest to least liking.

TABLE 172.

MEAN PREFERENCE RATINGS OF BOOKS READ

	Gifted Boys	Gifted Girls	Control Boys	Control Girls
Fairy tales, folk tales, and legends	3.2	2.6	3.0	2.7
Nature and animal stories	2.7	2.4	2.8	2.6
History, biography, and travel	1.8	2.0	2.5	2.8
Science	2.4	2.7	3.3	3.6
Stories of adventure or mystery (mostly boys' juveniles and series books)	1.5	1.8	1.3	2.0
Stories of home and school life (mostly girls' books)	3.4	1.3	3.2	1.4
Poetry and drama	3.9	3.5	4.3	3.9
Children's encyclopedias	2.9	3.2	3.7	4.3
Informational fiction, including the classics	1.9	1.8	2.2	2.1
Emotional fiction (the popular novel and love story)	2.3	1.5	2.5	1.8

Table 172 shows that in general the books which are most frequently read are the books which are best liked. This was to be expected, but the figures lend emphasis. The average of the rating is decidedly higher for the gifted than for the control, and slightly higher for girls than for boys. This may be taken as additional evidence that reading is more enjoyed by gifted than by unselected children, and more enjoyed by girls than by boys.

FAVORITE BOOKS

In the Interest Blank the children were asked to name four or five books they had most enjoyed reading in the last year. Responses were obtained from 602 of the main experimental group and from 1,225 unselected school children. The

books listed cover so wide a range that the number who name any one book is too small to give a reliable comparison of the preferences of the two intelligence groups. The sex differences, however, were more marked than the intelligence differences, and the two intelligence groups have therefore been combined to secure a list of the twenty books most liked by boys and the twenty most liked by girls. They are as follows, listed in rank order:

The Twenty Books Most Liked by Boys

1. *Treasure Island** . . . . . Stevenson
2. *Call of the Wild** . . . . . Jack London
3. *Tom Sawyer* . . . . . Mark Twain
4. *Robinson Crusoe* . . . . . Defoe
5. *Three Musketeers** . . . . . Dumas
6. *Ivanhoe** . . . . . Scott
7. *Huckleberry Finn* . . . . . Mark Twain
8. *Penrod* . . . . . Tarkington
9. *Sherlock Holmes* . . . . . Conan Doyle
10. *Kidnapped* . . . . . Stevenson
11. *Black Beauty* . . . . . Sewall
12. *Swiss Family Robinson* . . . . . Wyss
13. *Connecticut Yankee* . . . . . Twain
14. *Tale of Two Cities** . . . . . Dickens
15. *Count of Monte Cristo* . . . . . Dumas
16. *Penrod and Sam* . . . . . Tarkington
17. *White Fang* . . . . . Jack London
18. *Last of the Mohicans* . . . . . Cooper
19. *Jungle Books* . . . . . Kipling
20. *Oliver Twist* . . . . . Dickens

The Twenty Books Most Liked by Girls

1. *Little Women* . . . . . Alcott
2. *Anne of Green Gables* . . . . . Montgomery
3. *Ivanhoe** . . . . . Scott
4. *Little Men* . . . . . Alcott
5. *Treasure Island** . . . . . Stevenson
6. *Laddie* . . . . . Porter, G. S.
7. *Three Musketeers** . . . . . Dumas
8. *Alice in Wonderland* . . . . . Carroll
9. *Heidi* . . . . . Spyri
10. *Pollyanna* . . . . . Porter, E.
11. *Secret Garden* . . . . . Burnett
12. *Rebecca of Sunnybrook Farm* . . . . . Wiggin
13. *David Copperfield* . . . . . Dickens
14. *Little Lord Fauntleroy* . . . . . Burnett
15. *Call of the Wild** . . . . . London
16. *Eight Cousins* . . . . . Alcott

17. *Freckles* . . . . . Porter, G.
18. *Little Minister* . . . . . Barrie
19. *Tale of Two Cities** . . . . . Dickens
20. *Uncle Tom's Cabin* . . . . . Stowe

Series books could not be included in the above lists, since they were usually mentioned as a series rather than as individual books, but when they were treated separately it was found that for girls the *Oz* books were the most popular series, with the *Little Colonel* books coming next. For boys, the *Book of Knowledge* showed a surprising lead, with the *Oz* books second.

Some of the interesting facts brought out by the above table are the following:

1. With the exception of the *Book of Knowledge,* all of the most liked books are fiction. This is partly explained by the fact that the non-fiction reading covered such a wide range that agreement of choice occurred but seldom; nevertheless, even if liberal allowance is made for this factor, it appears that fiction still holds first place in the reading preferences of both boys and girls.

2. In the type of fiction preferred, striking sex differences are seen. These are in agreement with the findings already set forth; the boys prefer stories of adventure and mystery, while the girls prefer stories of home and school life.

3. Only five titles (those starred) appear in both lists; in other words, the lists are mutually exclusive to the extent of 75 per cent. That the lists overlap at all is due almost entirely to the fact that girls frequently read boys' books. Distinctly girls' books are rarely read by boys. The five titles appearing in both lists are *Treasure Island, Call of the Wild, Ivanhoe, Three Musketeers,* and *Tale of Two Cities.*

Summary

1. The mean number of hours of reading per week by gifted children (parent's estimates) increases from about 6 at age 7 to 12 at age 13. At all ages below 13 the mean is slightly higher for gifted boys than for gifted girls.

2. According to teachers' estimates, 88 per cent of the gifted and 34 per cent of the control group read more than the average child; 0 per cent of the gifted and 22 per cent of the control group read less than the average child.

3. Children of the gifted groups and of a control group kept a record of the books read during two months. Analysis has been made of such records for 511 gifted and 808 control children.

4. The reading records show that the average gifted child of 7 years reads more books in the two months than the average of the control group for any age up to 15. The average of gifted children at 8 or 9 years is three times that for the control group of the same age. By this time the average gifted child has almost attained his maximum as to number of books read.

5. Of the control group who had attained the age of 8 years, 13 per cent read no books at all during the two months; of the gifted group who were 8 years old or older, none had so poor a record.

6. Classification of the books read by the two groups brought out the fact that the gifted children read over a considerably wider range than the control children, and that they read more science, history, biography, travel, folk tales, informational fiction, poetry, and drama. On the other hand, in proportion to the total number of books read the gifted read fewer books of adventure or mystery and far less emotional fiction.

7. In both gifted and control groups the boys scatter their reading over a much wider range than do the girls. Girls are much more likely than boys to read a book two or more times.

8. Boys read about three times as many books of adventure or mystery as the girls read of this type, while the girls read nearly five times as much emotional fiction as boys read.

9. When the twenty most popular books were listed for each sex only five books were found in both lists.

10. With the exception of the *Book of Knowledge*, all of the twenty best-liked books (both lists) were fiction.

CHAPTER XVI

TESTS OF INTELLECTUAL, SOCIAL, AND ACTIVITY INTERESTS

Jennie Benson Wyman

Introductory statement. Apart from the data of the two preceding chapters, more or less light has been thrown on the interests of gifted children in a number of divisions of this study. The educational history of the children, as given by parents and teachers (Chapter X), the tests of information and achievement (Chapters XI and XII), the ratings given by parents and teachers on personality traits (Chapter XVIII), and the comparative study of the mental development of eminent individuals (Volume II), have all suggested the importance of interest as a determinant of achievement and as a factor to be considered in individual diagnosis and educational treatment. In many cases, however, the evidence has been indirect and inferential. It is inadequate for its purpose in the same way that class marks and teachers' estimates of the quality of school work are inadequate to establish the exact status of a child with respect to his educational accomplishment. In both cases the data supplied by parents, teachers, and others are open to suspicion on the ground that the judgments rendered may have been influenced by suggestion, "halo" effects, or other forms of bias. We do not know in what respects and to what extent the various kinds of testimony and ratings would have differed from those obtained if parents and teachers had been led to believe that the tests showed the children to be average or inferior in intelligence instead of "gifted." Even the testimony of the children themselves in regard to their interests cannot be accepted at its face value. In the first place, children have no standard by which to judge the absolute strength of their interests. In the second place, they are likely to be misled in regard to the relative amount of interest they have for the different studies and activities by the influence of associations, like or dislike for a teacher, etc. The need, of course, is for a measure of interest that would be as objective, as consistent, and as valid as the best measures of intelligence or educational achievement.

It is a large undertaking, however, to set about the derivation of such a test. The quantitative study of interest is not only a relatively new field, but one which is also inherently difficult. Interest seems very intangible in comparison, for example, with intelligence. Intelligence is abiding, it does not ordinarily take wings, or completely alter its form and substance, as interest is so likely to do, the moment one approaches it with a test. Obviously the measurement of interest is a problem which cannot be solved by any single attack, however

skillfully planned. The attempt, nevertheless, seemed worth making, and the task of devising a valid method was entrusted to Mrs. Jennie Benson Wyman, a graduate student in education and psychology at Stanford University. Mrs. Wyman devoted to the problem the greater part of her time for more than two years, working chiefly under the direction of Dr. Kelley.

It is possible to present here only a brief description of her methods and a summary of the most important of her findings.

LEWIS M. TERMAN.

METHOD OF APPROACH

A canvass of the experimental studies of emotional and personality traits led to the belief that the free association method offered the most promising line of attack for the measurement of interest. The investigations of Jung, of Kent and Rosanoff, and of many other workers had shown clearly that an individual's characteristic tendencies of thought, emotion and will may reveal themselves in the apparently trivial responses to stimulus words in such a test. If it is possible thus to uncover mental complexes which lead to abnormal behavior, and this possibility has been sufficiently demonstrated, why should not important underlying interest trends also be brought to light by an association test specially planned for the purpose?

It was necessary, of course, to limit the undertaking to the measurement of a few significant aspects of interest. An extended consideration of the types of interest which are probably most influential in molding one's personality, determining one's attitudes, and shaping one's life habits led to the selection of the following three types for investigation: (1) intellectual interests, (2) social interests, and (3) activity interests. These seemed to be the most promising from the point of view of experimental procedure, and at the same time highly significant in connection with the study of gifted children. According to the traditional psychology of genius, the gifted individual tends to develop his intellectual interests at the expense of his interests in social and activity fields. The social and activity interests, perhaps in the first place inherently weak, are supposed to undergo continuous atrophy until the individual withdraws from active participation in affairs and becomes socially disinterested and ineffective. The ill-balanced Hamlet is often pointed to as an example of what results from too much thinking combined

with too little "mixing" and doing. At any rate, it would be extremely desirable to have for each of our gifted children a set of objectively derived scores which would measure both the relative and the absolute strength of the intellectual, social, and activity interests.

In order to test these three aspects of interests the dictionary was scanned for words which, when used as stimulus words in a free association test, were equally adapted to provoke responses due to intellectual interests, social interests, or activity interests. That is, with respect to these interests the stimulus words were to be of the "balanced" type, so that a small preponderance of interest in any one of the three directions would reveal itself in the nature of the responses. First a list of 800 words was drawn up. For a preliminary experiment this was reduced to 80, composing four comparable lists of 20 words each. It was necessary that the words retained should satisfy the following conditions:

1. They should be in common use. All were excluded which were not found in first 2,000 of Thorndike's word list.
2. They should not be too readily definable.
3. They should not be too much "tied" with other words through continued association with them.
4. They should not be words which would yield a large percentage of opposites in the responses.
5. They should be words which would not leave too strong an impression on the mind and produce a carry-over effect.
6. The list as a whole should have a cyclic character so that it could be broken up into four comparable brief lists.

The 80 words thus selected were tried out on a number of subjects individually and in small groups, in order to get an idea of the technique that should be used with respect to presentation of stimulus, method of response, timing, etc. Group administration was found to be feasible. The stimulus words were presented visually and at the same time pronounced by the experimenter. Response was by writing. A rate of one stimulus word every eight seconds was found the most satisfactory for children of the upper elementary grades.

Preliminary Experiment

The provisional list of words was given to 175 pupils of the sixth and seventh grades, 40 words on one day and the

other 40 two weeks later. The children were simply told to "write down in one word" what the word shown made them think of. No examples of how to respond were given.

Responses were then analyzed for their significance. It was necessary to score each response three times; first for its intellectual value, next for its social value, and finally for its activity value. Rating was at first on a scale of 5 to 0 for each response and was based on the experimenter's subjective judgment as to the intellectual, social, or activity value of the response. The following reliability coefficients and intercorrelations were found for two groups of 12 year olds selected from the 175 children tested:

Reliability coefficients (80 word list):

	City A (51 cases)	City B (39 cases)
Intellectual interest	.85	.89
Social interest	.66	.66
Activity interest	.48	.45
Intercorrelations		
Intellectual vs. social	.36	.56
Intellectual vs. activity	.20	.10
Social vs. activity	–.08	.21

Eighteen of these children were given a rank order rating by one teacher on each of the three interest traits. This gave the following rank-order correlations between test score and teacher's estimate:

Intellectual interest	.67
Social interest	.49
Activity interest	.22

The above results were deemed promising, but it was found necessary to make extensive revisions in the list of stimulus words and to derive a more objective method of scoring. Some of the words gave little variety of response, some tended to provoke too many definitions, and some of the pairs that were believed to be comparable proved not to be. Of the original list of 80 words, 37 were eliminated, and enough new words were added to give two comparable lists of 80 each.

The new lists were then given to the children who had taken the provisional list and to several other groups. As there were 47 words common to the provisional list and the

revised list, it was possible to secure evidence as to the consistency of a test of this nature when it is repeated. In this case 13 months had elapsed since the first test was given. In order to make a valid comparison of the results of the two tests it was of course necessary to have a strictly objective method of scoring. For the immediate purpose of the comparison the following classification of responses was used:

1. Identity. Synonyms.
2. Contrast.
3. Causal Dependence.
4. Co-adjunction.
5. Subordination.
6. Supra-ordination.
7. Definitions or explanations.
8. Co-ordinations of undetermined quality.
9. Co-existence.
10. Judgment of value (predicate).
11. Judgment of fact (predicate).
12. Subject and object relation (predicate).
13. Associations denoting time, place, means, and purpose.
14. Reaction omitted.
15. Egocentric reaction.
16. Word of phrase completion—current phrases.
17. Repetition of stimulus word.
18. Meaningless reaction.
19. Non-specific reaction.
20. Clang-reactions.

There were 53 children who took both tests. Their responses were in each case classified into the above 20 categories, and a table for calculating the Mean Square Contingency was drawn up. Correction for too fine grouping necessitated grouping categories 2, 4, 6, and 8 together, and 17, 18, 19, and 20 together, which reduced the number of categories to 14. The coefficient for Mean Square Contingency was calculated and found to be $.856 \pm .0056$. There is accordingly a rather remarkable degree of constancy in the responses given by a child from year to year. It may be held, however, that this correlation is spuriously high for two reasons: (1) because of the memory factor; and (2) because certain responses are so "tied" with certain stimulus

words that they appear almost inevitably in the responses of any group of subjects. To meet these objections, the responses were examined again and all those which were given in the identical word in the two tests were eliminated. This necessitated the elimination of 22 per cent of the responses. The responses remaining yielded a Mean Square Contingency coefficient of .80. This showed that the functions measured by the test are not evanescent, but to a surprising degree permanent.

Further analysis of the responses of 31 seventh grade children to the revised list of 160 words showed the necessity for further revision. A few of the words brought too many failures to respond and a few tended to provoke perseveration. After necessary eliminations enough words remained to yield two comparable lists of 60 each. These are as follows:

1. summer	31. evening	1. night	31. sundown
2. easy	32. hard	2. simple	32. difficult
3. diamond	33. ring	3. gem	33. dress
4. tire	34. play	4. join	34. enjoy
5. dog	35. learn	5. control	35. need
6. fair	36. band	6. white	36. music
7. school	37. dark	7. college	37. black
8. help	38. platform	8. protect	38. stage
9. nature	39. pity	9. sky	39. watch
10. active	40. thrill	10. restless	40. excite
11. dream	41. idle	11. wonder	41. useful
12. shock	42. hero	12. fault	42. castle
13. joy	43. vacation	13. pleasure	43. holidays
14. dislike	44. master	14. detest	44. captain
15. nut	45. bat	15. paper	45. rod
16. go	46. fun	16. travel	46. mischief
17. angel	47. power	17. princess	47. rain
18. nice	48. interested	18. alone	48. interesting
19. water	49. fond	19. current	49. good
20. boy	50. trip	20. girl	50. journey
21. wish	51. make	21. desire	51. form
22. museum	52. yard	22. history	52. island
23. delight(ed)	53. aim	23. contented	53. try
24. work	54. fairy	24. train	54. giant
25. cave	55. exercise	25. adventure	55. game
26. pleasant	56. companion	26. happy	56. friend
27. house	57. career	27. marble	57. science
28. imagine	58. fire	28. invent	58. camp
29. range	59. like	29. country	59. prefer
30. admire	60. great	30. attract	60. grand

An attempt was made to improve the scoring of responses for intellectual interest on the basis of estimated values assigned by two judges to each of 26 classificatory categories, such as identity, contrast, causal dependence, co-adjunction, subordination, supra-ordination, definition, etc. The correlation between the values assigned by the two judges was .849. When this method of scoring was tried out, it was found to yield lower coefficients of reliability and validity than the more subjective method used earlier. However, as some kind of objective scoring method was deemed necessary, it was decided to work out empirically one based upon a comparative study of the responses of specially selected groups.

Derivation of the Scoring Method

The final list of 120 words was given to 689 gifted children, most of whom belonged to the main experimental group, and to a control group consisting of 609 unselected children of grades 4 to 8 in San Jose.[1] In addition, it was given to two special groups, which may be designated as A and B. Special group A consisted of 115 sixth and seventh grade pupils, and was to serve for the final try-out of the new scoring method and for the statistical analysis of the test itself. Special group B consisted of 150 seventh grade pupils. This group was given the test in two parts of 60 words each, with an interval of two weeks between the sittings. This group was reserved for the determination of the reliability of the test.

The teachers of all the seventh grade classes tested in special groups A and B were requested to make out three separate rank orders of their pupils, one for intellectual interest, one for social interest, and one for activity interest. The meanings to be attached to these terms were explained to the teachers as follows:

Intellectual Interest

A person with a high degree of intellectual interest is one interested in knowing—interested in getting at the meaning of things—the person who elects to "know," rather than to "do."

[1]This group may be designated as Control Group D, to distinguish it from control groups A, B, and C mentioned in preceding chapters.

Social Interest

Interest in persons—do not confuse social interest with social performance. The most popular person is not necessarily the one with the highest social interest.

Activity Interest

A person with a high degree of activity interest is the one who is interested in "doing" things—the leader—the one quick to respond —but not necessarily the one fondest of outdoor games. A person who prefers to "take part" rather than to "watch."

These types of interest are not mutually exclusive.

In the case of the seventh grade pupils of the control group the teachers were not asked to prepare rank orders, but merely to designate 10 pupils with much and 10 with little intellectual interest, 10 with much and 10 with little social interest, and 10 with much and 10 with little activity interest.

In one school there were 39 pupils for whom it was possible to secure rank order ratings from four teachers, A, B, C and D. Intellectual interests were rated by A and B, social interests by A and C, and activity interests by A and D. The rank-order correlations yielded the following reliability coefficients for the ratings:

rAB=.507 for intellectual interest
rAC=.694 for social interest
rAD=.273 for activity interest

Later, B, C, and D (A was no longer available) were asked to rate their pupils again; this time by stating merely whether a given pupil was intellectually interested or not, socially interested or not, interested in activity or not. This gave a second rating by B on intellectual interest, a second by C on social interest, and a second by D on activity interest. Bi-serial *r's* were then calculated as follows:

For B's two ratings on intellectual interest,	.93 ±.04
" C's " " " social "	.77 ±.07
" D's " " " activity "	.65 ±.08

On the basis of all the above ratings, six groups of children were made up, all in the seventh grade at the time the test was given, and all between the ages of 10½ and 14 years. These groups were as follows:

1.	With intellectual interest*	69
2.	Without " "	58
3.	With social "	71
4.	Without " "	67
5.	With activity "	71
6.	Without " "	56

* "With" and "without" are here used as comparative terms, "with" indicating the upper end of a continuous distribution and "without" the lower end.

These groups were to serve as a basis for deriving the scores to be assigned to response words. A particular response word given by a large percentage of the "with" group and by a small percentage of the "without" group (or vice versa) has a high differentiating value and is diagnostic. For each response, therefore, the frequency was found separately for the "with" group and the "without" group, in terms of the per cent who gave it. The difference between these two per cents was also found. Next the S.D. of each per cent was computed, and the S.D. of the difference between the two per cents. Comparing the difference between the per cents with the S.D. of the difference gave a measure of the amount of a particular kind of interest involved in a particular response word. Accordingly, the score assigned to a response word was the difference between the per cents of "with" and "without" groups giving it divided by the S.D. of this difference. The ratios thus obtained were then transmuted into a 0-20 scale, 0 indicating no interest and 20 maximum interest. It was necessary, of course, to carry through this procedure separately for the three kinds of interests. In all, there were 10,880 response words to evaluate, each three times. Upward of 13,000 additional responses were encountered in scoring the papers of other groups of children tested.

A serious difficulty encountered in the evaluation of response words arose from the fact that sometimes a stimulus word brought two or more responses obviously differing little in significance but appearing with very different frequency. Moreover, in scoring the papers of the various groups tested, many response words were encountered which were not given by any pupil in the six "with" and "without" groups used in the derivation of the scoring method. For both of these reasons the grouping of response words be-

came necessary.[1] This involved a considerable amount of subjective judgment, the effect of which is to reduce to some extent the reliability and validity of the test.

Each of the 10,880 response words encountered was thus allotted three scores, one for each of the three types of interest. The key for scoring the responses to a single stimulus word fills an entire page. Two sample pages, for the scoring of responses to the stimulus words *gem* and *grand* follow. The three columns of scores are, in order, those for intellectual interest, social interest, and activity interest.

SCORES FOR RESPONSES TO STIMULUS WORD *GEM*

Frequency	Responses	I	S	A
44	——	4	4	8
114	diamond	20	11	15
79	stone	12	10	15
57	jewel(s)	12	13	5
23	ruby	20	11	15
14	ring(s)	9	13	5
12	exercise(s)	3	9	12
12	precious	10	11	8
10	pearl	20	11	15
10	razor	3	9	6
6	boy	11	13	9
	basketball	8	9	12
	beautiful	10	11	8
	biscuits	3	9	12
	blade	3	9	6
	bread	3	9	12
	cake	3	9	12
	cast	8	9	6
	city	3	9	12
	Columbia	3	9	12
	Columbus	3	9	12
	cook	10	13	12
	country	3	9	12
	diamond ring	9	13	5
	doughnuts	3	9	12
	easy	10	11	8
	eat	10	13	12
	emerald	20	11	15
	events	8	6	7
	garnet	20	11	15
	gold	10	11	15
	good	10	11	8
	green	10	11	8
	gum	12	10	12
	gun	10	10	7
	hard	10	11	8
	Island of Gems	10	10	10
	jelly	3	9	12
	jewelry	9	13	5
	Jim	10	10	7
	juice	8	9	6
	light	3	9	6
	meet	12	10	12
	memory	8	6	7
	mine	9	7	5
	mineral	12	10	15
	money	8	7	5
	muscle	11	9	12
	name	8	6	5
	nursery	3	13	12
	ocean	7	6	13
	pearl divers	20	11	9
	physical aid	8	9	12
	play	10	10	12

[1]The method by which the grouping was done is too complicated to describe here.

Responses	I	S	A
playground	3	13	12
playroom	3	13	12
precious stone	12	11	15
present	7	13	5
pretty	10	11	8
razor blade	3	9	6
red	10	11	8
rich	10	11	8
riches	8	7	5
round	10	11	8
sapphire	20	11	15
show	7	6	13
sparkle	10	10	12
sparkling	10	11	8
sticks	10	10	10
thing	8	6	5
topaz	20	11	15
treasures	8	13	5
tree	8	9	6
valuable	10	11	8
water	7	6	13
wonderful	10	11	8

SCORES FOR RESPONSES TO STIMULUS WORD *GRAND*

Frequency	Responses	I	S	A
52	——	6	8	11
73	wonderful	16	13	8
33	good	10	7	8
31	great	10	11	8
27	nice	10	13	8
25	beautiful	12	12	8
20	fine	16	10	8
13	big	8	8	8
15	piano	8	9	11
12	lovely	10	12	8
10	ball	6	11	10
	admire	12	12	14
	army	6	9	6
	auto	6	10	10
	awful	12	10	8
	band	8	9	11
	believe it	10	10	12
	bicycle	6	10	11
	Cadillac	14	10	11
	camp	10	12	11
	candy	10	10	11
	Canyon	6	9	11
	castle(s)	14	6	10
	church	6	6	10
	clothes	6	8	10
	delightful	10	12	8
	dog	10	8	6
	evening	6	10	10
	feeling	6	10	10
	game	6	8	10
	glorious	16	12	8
	glorious time	13	10	10
	grand	12	8	14
	grandmother	12	13	14
	grandpa	12	13	14
	grand piano	12	13	14
	grandstand	12	13	14
	greatness	13	12	10
	hair	6	8	10
	he	8	8	12
	high	8	10	8
	holidays	13	10	10
	home	6	6	10
	honour	13	12	10
	horrid	12	10	8
	horse	10	8	6
	hotel	6	6	10
	house	6	6	10

Responses	I	S	A
imposing	16	12	8
independent	8	10	8
journey	6	8	10
king	13	9	6
lake	6	6	10
large	8	12	6
laugh	6	10	12
machine	6	10	10
magnificent	16	8	8
majestic	16	10	8
make	10	12	12
man	6	8	6
many	10	10	8
marvellous	16	10	8
millionaire	13	9	6
mountains	14	6	10
music	10	8	11
night	6	10	10
noble	16	10	8
old	8	10	8
opening	6	8	10
opera	6	9	11
palace	14	6	10
party	6	10	10
person	6	8	6
play	10	12	12
pleasant	10	11	8
pretty	8	12	8
programme	6	8	11
queens	13	9	6
river	6	6	10
science	14	8	10
show	16	13	11
something nice	10	10	8
splendid	16	8	8
stand	6	9	11
stately	16	10	8
study	10	12	12
sublime	16	10	8
surprise	14	10	14
swell	10	11	8
swimming	10	13	14
theatre	6	6	10
time	6	8	10
trees	14	6	10
useful	8	10	8
Valentino	13	12	6
wonder	14	13	10
woods	14	6	10

An examination of the above scores will bring many surprises. For example, one could not have foreseen that in response to the stimulus word *grand*, "fine" or "wonderful" would have a much higher intellectual value than "opera"; that "horse" would have a higher intellectual than activity value; that "nice" would have nearly twice as high social value as "good," etc. Nor could one have foreseen that in response to the stimulus word *gem*, "diamond" would have an intellectual value of 20, as compared with 9 for "jewelry"; or that "treasures" would have a higher social value than "money." One is not surprised to find that in response to most stimulus words "school" is social and "book" and

"study" non-social, or that "help" is more social than "pity"; but one could not have predicted with certainty that "girl" would prove to be more social than "boy," or "swimming" more active than "dancing."

Doubtless if the test were given to other criterion groups of children similarly chosen, and if the resulting data were similarly treated, the values found for the various responses would differ more or less from those which have been obtained. For differentiating between the criterion groups which were used, the values given are approximately correct. If one would learn the best method of scoring a mental test it is necessary to disregard all a priori considerations and follow the empirical method. For example, it was demonstrated empirically that failure to respond should not be given a score of zero, but a fairly high positive score, differing, however, with the different stimulus words.

Comparison of scores of unselected and gifted groups suggests that a test of this kind could be devised which would have considerable value as a measure of intelligence. Some of the words in the present list could be used for this purpose. In response to the stimulus word *night,* for example, 33 per cent of the gifted and 7 per cent of the control children give "darkness," while 33 per cent of the gifted and 72 per cent of the control give "dark." In response to the stimulus word *house,* 40 per cent of the gifted and 15 per cent of the control give "home"; while 2 per cent of the gifted and 20 per cent of the normal give "wood." Many other cases of this kind were found, but no attempt was made to derive a measure of intelligence from the list used.

Reliability of the Test

Reliability coefficients, S.D's, intercorrelations, and P.E's of scores were computed for the final list for unselected 12 year old children. These are given in Table 173.

The reliability coefficients are surprisingly high, considering that the entire test of 120 words may be given in about 16 minutes. The probable errors of the scores are correspondingly small. By trial it was found that when the test was given in two sittings separated by 10 days, instead of in a single sitting, the reliability coefficient for intellectual inter-

TABLE 173.

RELIABILITY COEFFICIENTS AND INTERCORRELATIONS FOR FINAL LIST

		12 year Girls	12 year Boys
(1) Reliability Coefficients	I. interest	.871	.828
	S. "	.817	.873
	A. "	.483	.867
(2) Standard Deviations	I. interest	8.09	8.52
	S. "	5.88	6.16
	A. "	3.62	4.60
(3) Inter-correlations	I. vs. S. interest	.683	.797
	I. vs. A. "	.286	.347
	S. vs. A. "	.321	.532
(4) P. E. of an Individual Score	I. interest	2.91	3.54
	S. "	2.52	2.20
	A. "	2.60	1.68

est was very much lowered, and that for activity interest considerably lowered. With social interest the difference was not significant.

VALIDITY OF THE TEST

The procedure adopted in determining the proper scoring responses guarantees to a degree the validity of the test. In order to determine the degree of validity, the test scores were correlated with teachers' ratings of the following six groups:

(a) 78 pupils of the { sixth and seventh grades, ranked by two teachers;
(b) 29 " " " seventh grade, " " " " "
(c) 21 " " " " " " " " "
(d) 22 " " " " " " " " "
(e) 32 " " " " " " " " "
(f) 24 " " " " " " " the same teacher with an interval of a year between the ratings.

The validity of the test as a measure of the three aspects of interest is indicated by the last column of (corrected) coefficients given in Table 174. The corrected coefficients were obtained by dividing the square root of the raw corre-

lation between test and criterion by the square root of the reliability coefficient of the criterion.

TABLE 174.

COEFFICIENTS SHOWING RELIABILITY OF CRITERION AND VALIDITY OF INTEREST TEST

		Reliability of criterion	$\sqrt{\text{Rel. Coeff.}}$	Raw Correl. with Criterion	Corrected Correl. with Criterion	
(a)	I	.617	.786	.541	.68	I
	S	.365	.604	.245	.41	S
	A	.402	.634	.201	.32	A
(b)	I	.588	.767	.538	.70	I
	S	.602	.776	.347	.45	S
	A	.292	.540	.376	.70	A
(c)	I	.767	.876	.696	.79	I
	S	.709	.842	.574	.68	S
	A	.281	.530	–.072		A
(d)	I	.598	.773	.391	.51	I
	S	.570	.755	.392	.52	S
	A	.360	.600	.189	.31	A
(e)	I	.520	.721	.460	.64	I
	S	.590	.770	.260	.34	S
	A	.465	.682	–.154		A
(f)	I	.858	.926	.538	.58	I
	S	.359	.599	.347	.58	S
	A	.503	.709	.376	.53	A

(The raw correlation given in each case is the higher one of the two.)

The average corrected correlations with criterion for the six groups of children are as follows:

For intellectual interest	.65
For social interest	.496
For activity interest	.31

The first two of these are nearly as high as similar correlations yielded by the intelligence tests available a few years ago. The third is lower. All are high enough to make possible a reasonably valid comparison of two such large groups of children as our gifted and control groups.

Case Comparisons

Additional evidence as to validity was obtained by examining the supplementary information furnished by parents and teachers concerning 32 gifted children who had earned high scores on at least one of the three kinds of interest.

The first 16 cases are selected for high scores in intellectual interest (140 or above, as compared with norm of 118). Four of these also have high scores in social interest (130 or more, as compared with norm of 117), and one has a high score in activity interest (above 130, as compared with norm of 122). High scores are indicated in italics. In each case the first three figures give, in order, the scores on intellectual interest, social interest, and activity interest.

Case	I.	S.	A.	
(1)	*145.*	*130.*	125,	girl 12, 145. Precocious—charmingly natural.
(2)	*144.*	*135.*	124,	girl 11, 149. Likes history and geography —musical genius—extremely popular with adults and children alike—likes to reason things out—inventive turn of mind.
(3)	*143.*	128.	*130,*	boy 12, 151. Strong in literary subjects— wants to do newspaper work—musical appreciation—a "real" boy, normal in all respects.
(4)	*142.*	*131.*	122,	girl 12, 142. Good literary taste—whole family omnivorous readers—likes reading, geography, arithmetic and history—enjoys everything at school—"a most interesting and delightful child."
(5)	*142.*	*130.*	128,	boy 13, 146. Mathematical—lively—keen humour.
(6)	*142.*	129.	124,	girl 10, 149. Literary—prefers reading —tends to follow, not lead—modest.
(7)	*142.*	127.	127,	boy 13, 142. Would rather read than play —likes history—no leadership—dramatic ability—enjoys music.

Case	I	S	A	
(8)	*142.*	122.	122,	girl 12, 137. Good literary taste—mentally independent—old for her age—reserved—should have more social contacts.
(9)	*142.*	116.	128,	girl 13, 130. Literary—prefers reading—literary and artistic bent—quiet—shy.
(10)	*141.*	129.	127,	girl 13, 149. Likes history—wants to explore and be an archaeologist—loves animals—considered by some sluggish and inert.
(11)	*141.*	129.	125,	boy 13, 136. Prefers reading—quiet—must be leader or will not play in group—does not make friends easily—very interested in nature, camping, fishing, etc.
(12)	*141.*	129.	123,	boy 12, 155. Likes literature, composition, history—remarkable vocabulary—a born leader.
(13)	*141.*	129.	122,	boy 12, 140. Reads a great deal—likes arithmetic—prefers school to anything else—diplomatic—interested in people—normal social activities—a good swimmer—interested in engineering.
(14)	*140.*	129.	127,	girl 13. Reads everything she can get—most interested in languages—main interests are novels and a "good time."
(15)	*140.*	126.	124,	girl 11, 159. Prefers reading—likes English and music—"needs more play."
(16)	*140.*	118.	118,	girl 12, 142. Interested in reading—fond of music—does not make necessary social contacts—ranks average or below in all traits—needs to read less and play more.

Four of the above cases and eleven of the following have scores of 130, or higher, in social interest. One of the following has a score of 130 in activity interest:

Case	I	S	A	
(17)	138.	*139.*	129,	girl 11, 146. (Highest average score for all three interests.) Musical ability—enjoys school—happy with other pupils—can do every activity of child life—a good mimic—inordinately fond of animals.
(2)	144.	*135.*	124,	See previous list.

Case	I	S	A	
(18)	136.	*135.*	130,	girl 11, 158. Good all-round development —musical talent—prefers dancing—naturally friendly manners—extraordinary appreciation of beauty—aesthetic tendency—keen humour.
(19)	139.	*134.*	122,	girl 12. Musical genius—language aptitude—exceedingly attractive—tends to be a leader—rated as average for popularity —only average physical energy.
(20)	138.	*133.*	123,	boy 13, 145. Reads a great deal—likes arithmetic and literature—popular—keen sense of humour — enjoys all outdoor sports.
(21)	128.	*133.*	114,	boy 12, 156. Likes history and science — mathematical ability — reads tremendously — strong mechanical bent — very nearsighted—generally considered nonsocial but considered highly social by Dr. Terman's research assistant.
(22)	135.	*132.*	127,	girl 10, 145. Most interested in reading and history—strong sense of beauty—play interests normal but is handicapped in having only one child near for playing with.
(23)	138.	*131.*	127,	boy 12, 148. A reader—likes arithmetic —literature, science—artistic in temperament—has more than average ability in music and art—likes baseball—has no mechanical skill.
(6)	142.	*131.*	122,	See previous list.
(24)	136.	*131.*	125,	boy 12, 154. Interested in history, and geography, languages, arithmetic—unassuming but confident—never quarrels and is never quarrelled with — never bullies and is not easily bullied—a boy of "genuine worth."
(25)	134.	*131.*	124,	girl 11, 147. Interested in literature—dreamy — indefinite — lacks curiosity — keen musical appreciation—"household revolves round her."
(1)	145.	*130.*	125,	See previous list.
(5)	142.	*130.*	128,	See previous list.
(26)	137.	*130.*	126,	girl 12, 150. Loves outside—loves pets—at present absorbed in art.
(27)	134.	*130.*	120,	girl 11, 149. Logical mind—artistic inclination—poise—"domineered by mother."

Two from the above lists and the following five cases have scores of 130, or higher in activity interest.

Case	I	S	A	
(28)	133.	125.	*134,*	boy 11, 151. Interested in history—practical turn of mind—very quick reactions.
(29)	133.	126.	*132,*	girl 11, 143. "Considerable pep"—unusual poise — charming — decidedly a leader—unusual ability in directing class dramas, etc.—great ability and tact in managing others — extremely fond of music.
(30)	132.	126.	*131,*	boy 12, 148. (Little information available—a foreigner.) Interested in work and in play.
(31)	133.	124.	*131,*	girl 11, 132. Musical ability—quiet and unassuming — extraordinary amount of physical energy.
(18)	136.	135.	*130,*	See previous list.
(3)	143.	128.	*130,*	See previous list.
(32)	129.	128.	*130,*	girl 12, 140. Good story writer—good in dramatics — good in music and art — leader in her work and in her play.

From an examination of these cases, it is apparent that there is considerable agreement between the test results and the information supplied by parents and others. In no instance is there any marked discrepancy between the two sources of information; but in cases 10, 20, 21, and 25 there seems to be some contradiction. Number 10 is a child labeled "sluggish and inert"—with a score of 127 in activity; but since the child is anxious to "travel and explore" the test score may give a better indication of her activity interest than does her behavior. Number 20 has only the average score for activity interest, but enjoys outdoor sports. Number 21 is an interesting case. In the first place he reads enormously; but his intellectual interest score is lower than the average for gifted children. In the second place he is generally regarded as non-social, whereas the test score ranks him exceptionally high in social interest. In the opinion of Dr. Terman's research assistant, who knows this boy well, he ranks very high in social interest. The test here may be bringing out what is not superficially apparent. Number 25

has a high score for social interest, though she is characterized as "dreamy, indefinite, lacking in curiosity." The explanation may be here in the statement, "the household revolves round her."

The agreement between the test results and the different reports on these 32 gifted children is then a further indication that the test is a valid one for determining the direction of a child's interests.

The above brief case studies also throw light on the type of child who is intellectually interested, on the type who is socially interested, and on the type who is interested in activity. As we should expect, the intellectually interested type has literary tastes, is fond of reading, enjoys history, geography, and mathematics. The social type may be popular, but is not necessarily so. This type is happy with others, has a sense of humor and seems essentially to have æsthetic appreciation and the artistic temperament. The real activity type is not necessarily the one fond of outdoor games—rather is it the born leader, the one who can manage others, the one quick to respond; more briefly, the one with what is commonly called "pep."

Comparison of Gifted and Control Groups

Table 175 gives by age and sex the means and S.D's of the gifted and control group[1] on the three kinds of interest. The numbers are as follows:

Age	Boys		Girls	
	Gifted	Control	Gifted	Control
8	17	–[1]	20	–
9	48	–	43	–
10	50	43	41	47
11	75	65	59	46
12	62	54	64	68
13	61	67	50	84
14	32	47	32	42
15	20	28	15	18
Total	365	304	324	305
Group total	669		629	

[1]The lowest grade tested for the establishment of norms was grade 4, as the test is not easily administered to unselected children below this level of school advancement. Control children below age 10 were omitted from the calculations.

TABLE 175.

MEANS AND S.D'S OF GIFTED AND CONTROL GROUPS ON INTELLECTUAL, SOCIAL, AND ACTIVITY INTERESTS

Age	Boys				Girls			
	Gifted		Control		Gifted		Control	
	M	S.D.	M	S.D.	M	S.D.	M	S.D.
Intellectual Interests								
8	112.5	10.27	–	–	119.8	5.65	–	–
9	125.3	7.64	–	–	124.7	8.71	–	–
10	126.6	7.50	110.1	11.36	128.3	6.80	112.3	9.94
11	129.4	5.80	115.1	10.26	130.3	5.56	116.0	9.90
12	133.2	5.11	119.3	9.79	131.4	6.50	118.8	10.03
13	131.9	6.18	119.2	9.21	130.0	6.63	120.3	9.35
14	132.2	5.20	*119.0	10.33	133.0	4.70	*121.1	7.52
15	129.3	8.74	*116.1	8.35	132.5	4.84	*116.7	9.37
Social Interests								
8	113.8	5.67	–	–	118.4	3.23	–	–
9	120.5	4.15	–	–	122.3	5.26	–	–
10	120.6	4.89	111.6	6.04	122.8	5.95	115.0	6.86
11	120.9	4.60	114.5	6.22	124.0	4.99	117.3	6.83
12	123.1	4.41	116.8	6.69	124.0	4.65	117.4	6.67
13	122.7	4.95	116.1	6.71	122.1	4.25	119.0	5.88
14	122.4	4.99	*116.2	6.47	123.9	2.59	*119.3	5.76
15	121.4	4.23	*116.9	4.38	123.9	2.70	*116.4	5.17
Activity Interests								
8	121.8	3.98	–	–	122.6	2.70	–	–
9	123.8	3.43	–	–	123.6	3.30	–	–
10	124.3	3.28	120.0	4.03	122.6	4.35	120.7	3.24
11	123.6	3.78	122.0	5.21	123.2	4.10	122.4	4.44
12	123.3	3.59	123.4	4.32	122.3	3.76	121.8	4.10
13	124.0	3.10	123.4	4.27	122.1	3.66	121.4	4.36
14	122.9	3.06	*123.9	4.77	121.8	3.39	*123.2	3.78
15	122.0	3.77	*124.6	4.89	121.7	3.75	*121.6	2.59

* "Selected group"—14 and 15 year olds in high school not tested.

From the above figures it is apparent

(1) That there is considerable growth from year to year in intellectual interests, only a little in social interests, and almost none in activity interests;

(2) That sex differences are non-existent for intellectual interests, but that girls rate slightly higher at nearly all ages in social interests, and boys slightly higher at most ages in activity interests;

(3) That the means for the gifted are in most cases significantly higher than for the control.

How significant the differences are between the gifted and control groups may be seen from Table 176, which gives

for the ages 10 to 13 the ratios of the differences to the P.E's of the differences. Wherever this ratio is greater than 3 P.E. the difference may be considered significant.

TABLE 176.

SIGNIFICANCE OF THE DIFFERENCES BETWEEN GIFTED AND CONTROL GROUPS IN INTEREST SCORES

		Intellectual Interests		Social Interests		Activity Interests	
Age	Sex	Diff. / P.E. of Diff.	Ratio in P.E's	Diff. / P.E. of Diff.	Ratio in P.E's	Diff. / P.E. of Diff.	Ratio in P.E's
10	Boys	16.48 / 1.37	12.0	9.01 / .78	11.6	4.30 / .52	8.2
	Girls	16.0 / 1.21	13.2	7.81 / .92	8.5	1.97 / .56	3.5
11	Boys	14.29 / .97	14.7	6.42 / .63	10.2	1.60 / .53	3.0
	Girls	14.30 / 1.1	13.0	6.70 / .81	8.27	.79 / .57	1.4
12	Boys	13.84 / .998	13.9	6.24 / .72	8.70	–.13 / .37	–0.35
	Girls	12.60 / .98	12.9	6.60 / .67	9.85	.52 / .46	1.1
13	Boys	12.65 / .93	13.6	6.67 / .70	9.50	.60 / .44	1.36
	Girls	9.81 / .94	10.4	3.04 / .59	5.15	.61 / .47	1.3

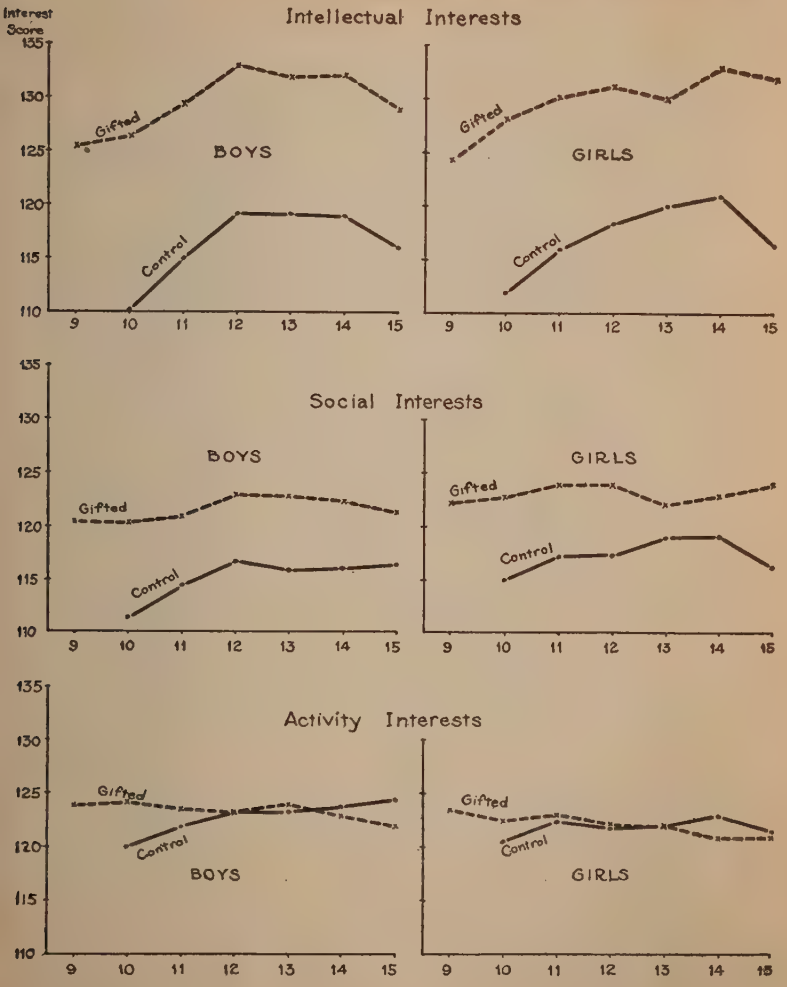
The differences in the case of intellectual and social interests are all highly significant, while those for activity interests are significant only at age 10 for girls and ages 10 and 11 for boys. The highest individual scores found were as follows:

For intellectual interests, 145, 12 year old gifted girl
For social interests, 139, 11 year old gifted girl
For activity interests, 138, 12 year old control boy
For total of the three interests, 406, 11 year old gifted girl.

Figure 27, which gives the curves of mean score for the gifted and control groups, by age and sex, makes clear the relative positions of the two groups in each of the three

FIGURE 27.

MEAN SCORES IN INTEREST TESTS, GIFTED AND CONTROL GROUPS, BY AGE



types of interest. In contrast to the girls, both gifted and control boys show a decrease in intellectual interest from 12 to 15 years. In activity interest the gifted, both girls and boys, show a noticeable tendency to decrease of score with age; with control boys the curve shows a small continuous rise, while with control girls it is approximately a plateau.

That intellectually gifted children should surpass the average in their intellectual interests was to be expected. For the first time, however, we are able to express this superiority in quantitative terms; it is approximately 1.4 times the standard deviation found for unselected children of corresponding age, or approximately half as great as their superiority in intellectual ability as measured by the Stanford-Binet test. In intellectual interest about 90 per cent of the gifted equal or exceed the mean of unselected children. The quantitative scores for the social and activity interests of gifted children add more to our previous knowledge than those for intellectual interests. Instead of lacking social interests, as many have believed, the typical gifted child stands in this respect about one standard deviation above the mean for unselected children of corresponding age. Roughly, 85 per cent of the former equal or exceed the mean of the latter in social interest. In activity interests the gifted are neither more nor less than normal. Even if our test of interests should prove to be much too unreliable for use as a measure of the individual child, these conclusions would still be justified in comparing a large group of gifted children with a large unselected group, and this is the point of chief interest.

Evidence from other sources regarding the interests of our gifted subjects agrees in general fairly well with the evidence of the interest tests. These children have more than average liking for their school work (Chapter X) and for intellectual plays and games (Chapter XIV). They show somewhat less preference for active games than do average children (Chapter XIV). Teachers and parents both rate them highest in such traits as originality, desire to know, and general intelligence. They rate them considerably lower on social traits like "fondness for large group," "leadership," and "popularity with other children," but on these traits, also, they rate them above unselected children (Chapter XVIII). Interest in activity, unfortunately, was not included

in the 25 traits on which ratings were secured from parents and teachers.

The Influence of Interest upon School Achievement

Information on the relation between interest and achievement was obtained by giving to a group of 81 children of the high sixth, low seventh, and high seventh grades the interest test, the National Intelligence Test, and the Stanford Achievement Test. For this group the reliabilities of the tests, their raw intercorrelations, and their intercorrelations corrected for attenuation were found. Partial correlations were then computed, based on the corrected intercorrelations, to show the effect of eliminating, successively, intellectual interest, intelligence, social interest, and activity interest. For this group reliability coefficients were as follows:

Intellectual Interest	.935
Social Interest	.832
Activity Interest	.859
National Intelligence Test	.907
Stanford Achievement Total	.935

The intercorrelations, corrected for attenuation, were as follows:

	Intel. Int.	Soc. Int.	Activ. Int.	N.I.T.
Social Interest	.798			
Activity Interest	.579	.512		
Nat'l Intel. Test	.463	.498	.465	
Achievement Total*	.629	.496	.397	.817

* Intercorrelations for the separate tests of the Stanford Achievement battery are given in Table 119.

From the above figures it is apparent (1) that each test measures something with a fairly high degree of reliability and (2) that this something is far from identical in the various tests.

With intellectual interest rendered constant we have:

	Soc. Int.	Activ. Int.	N.I.T.
Activity Interest	.102		
National Intelligence Test	.242	.272	
Achievement Total	.011	.052	.763

With intelligence (N.I.T. score) rendered constant:

	Intel. Int.	Soc. Int.	Activ. Int.
Social Interest	.737		
Activity Interest	.464	.365	
Achievement Total	.490	.178	.033

With social interest constant:

	Intel. Int.	Activ. Int.	N.I.T.
Activity Interest	.328		
National Intelligence Test	.126	.250	
Achievement Total	.445	.157	.757

With activity interest constant:

	Intel. Int.	Soc. Int.	N.I.T.
Social Interest	.716		
National Intelligence Test	.269	.341	
Achievement Total	.535	.372	.778

The correlation between intelligence and the achievement total, when the effect of intellectual interest is eliminated, is .763. The correlation between intellectual interest and the achievement total, when the effect of intelligence is eliminated, is .490. These correlations give a comparative measure of the effect of these two functions on success as measured by achievement in school subjects. Intellectual interest is a very potent factor in determining achievement. But the question arises, must a child be interested in what he is doing in order to achieve success in it, or is it the ability to succeed that gives the interest? In which direction does the causal relation lie? We find that the most successful child is highly intelligent and highly interested. Some children who are not highly interested have succeeded, but they are highly intelligent. Again, some highly intelligent, but not highly interested, have not succeeded; and, finally, some with lower intelligence and not a high degree of success are highly interested. The answer to the question, then, is that a child must be interested to achieve success, the greater the interest and the higher the intelligence, the greater the success—and not that ability to succeed produces the interest.

With regard to social interest and activity interest, when

the effect of intelligence is eliminated, social interest shows a very slight correlation with achievement; and activity interest has no influence at all.

Analyzing the data further, in order to determine which school subjects are most influenced by intellectual interest, with the effect of intelligence removed, we find it has, probably, the greatest influence on arithmetical reasoning, though the influence is significant for all subjects except spelling. What little correlation there is with spelling could easily be due to chance, so that intellectual interest has no influence on success in spelling. Social interest, judging the correlations in the light of their P.E's, has very little effect on any of the school subjects; and activity interest has no influence at all.

When, on the other hand, we examine the correlations between social interest and the school subjects when the effect of intellectual interest is eliminated, we find there is no correlation; and with arithmetical reasoning there is probably a negative correlation. Between activity interest and success in the school subjects there is no correlation at all.

We are in a position, then, for judging the precise influence of the various interests on achievement in school subjects.

Other significant facts are brought out by the partial correlations. There is the greater association between intellectual and social interest, between intellectual and activity interest, and between social and activity interest than between any one of these and intelligence. This throws light on the meaning of interest itself. Further light is thrown on it when we consider, on the one hand, the lack of correlation between social interest and history information, the low correlation between social interest and science information, and between social interest and all school achievement, and, on the other hand, the very high correlation between social interest and intellectual interest. This is a definite denial that interest is knowledge. Again, the low correlation between activity interest and achievement, and the high correlation between intelligence and achievement, throw important light on the meaning of intelligence scores—they are void of meaning in terms of activity. This was also borne out by the lower scores of the gifted children in activity interest, compared with their scores in intellectual and in social interests.

Summary

1. A free association test has been devised for the measurement of three types of interest: intellectual interest, social interest, and activity interest. The reliability coefficients of the test, .80 to .90, compare favorably with those of current intelligence tests. The validity coefficients are somewhat lower, but are high enough to permit valid comparisons between groups of subjects, if not between individuals. The average of the validity coefficients found is .65 for intellectual interest, .50 for social interest, and .31 for activity interest. Case studies furnish additional evidence of validity.

2. The new interest test was given to 689 gifted children and to 609 composing a control group (Control Group D).

3. The scores indicate that there is considerable increase of intellectual interest with age, only a little increase in the case of social interest, and none with activity interest.

4. There are no sex differences in intellectual interest, but girls surpass boys at nearly all ages in social interest and boys surpass girls at most ages in activity interest.

5. In intellectual interest the mean score of the gifted children at most ages exceeds the mean of unselected children of corresponding age by approximately 1.4 times the S.D. of the latter. This is approximately half as great a degree of superiority as obtains in the case of intelligence. Stated in another way, about 90 per cent of the gifted children equal or exceed the mean of unselected children in intellectual interest.

6. The superiority of the gifted in social interest is somewhat less, but is still very decisive, the mean of the gifted being about one S.D. above that of the control group. Roughly, 84 per cent of gifted equal or exceed the mean of unselected children in social interest.

7. With respect to activity interest, gifted and control groups do not differ materially.

8. A special group that was given the Interest Test was also given the National Intelligence Test and the Stanford Achievement Tests. Intercorrelations of all these tests were computed and the method of partial correlation was applied. This treatment made it possible to secure a measure of the relative effect of intelligence and of intellectual interest upon

achievement. The correlation between intelligence and achievement when intellectual interest is rendered constant is .76. The correlation between intellectual interest and achievement when intelligence is rendered constant is .49.

9. The influence of intellectual interest on achievement is significant for all the school subjects except spelling, but is greatest in the case of arithmetical reasoning.

10. Similar treatment shows that social interest and activity interest have, of themselves, practically no effect upon school achievement.

CHAPTER XVII

TESTS OF CHARACTER AND PERSONALITY TRAITS[1]

Tests of character and personality traits are a relatively new development in psychology and are still on a much less satisfactory basis than tests of intelligence, information, or school achievement. However, in view of the great desirability of obtaining character data which would be more objective than the trait ratings supplied by parents and teachers, and in view of the promising results which had been secured by Voelker, Cady, and other workers in this field, a comparison of gifted and unselected children on a battery of such tests seemed worth undertaking.

Methods of approach which were considered included the free association method of Kent and Rosanoff, the Pressey method of testing emotionality, the Downey will-temperament tests, the Woodworth-Cady questionnaire-test of psychopathic tendencies, and the methods developed by Voelker and Cady for testing honesty and incorrigibility. The Kent-Rosanoff test would doubtless have yielded results of great interest, but it had to be ruled out because it is not adapted to group testing. The Pressey method was not very suitable for young children and had not been sufficiently validated. The Downey will-temperament test was dropped from consideration because of the extremely low reliability and validity coefficients which it has generally yielded. The Voelker-Cady tests, on the other hand, were suitable for children, had been subjected to rigid statistical procedures, and had been demonstrated to have a fairly high degree of reliability and validity. Mr. A. S. Raubenheimer undertook the task of preparing a series of tests which would be diagnostic of much the same traits Voelker and Cady had attempted to measure, and at the same time free from certain objectionable features of their tests. Before describing his experiment, a brief account will be given of the work of Voelker and Cady.

[1]Written with the assistance of A. S. Raubenheimer and Florence L. Goodenough.

Voelker devised ten tests of trustworthiness, the total score of which, applied to boys, correlated .75 with the total of another similar series and, on an average, .60 with the judgments of teachers and scout leaders.[1] The traits tested were as follows:

1. Willingness to accept undeserved credit (overstatement test)
2. Suggestivity, as indicated by the M and N test in the Downey will-temperament series
3. Willingness to accept help in solving puzzles after promising not to accept help
4. Conscientousness in returning borrowed property
5. Dishonesty in accepting overchange
6. Willingness to accept a tip for a trifling courtesy
7. Trustworthiness in performing a routine task under temptation to neglect it (pushing a button every two minutes for ten minutes)
8. Similar to Test 7; task is to cancel A's in a book containing extremely interesting pictures
9. Willingness to "peep" when placed on one's honor to perform a task with the eyes closed
10. Willingness to cheat in scoring one's own responses to a test.

The Voelker tests were all of the "performance" type; that is, the subject was confronted by a natural situation in which there was genuine temptation and his score depended upon how he met the situation. There can be no doubt that they were severe tests of actual trustworthiness. Some of his tests were unsuitable for our purpose because they could not be given to groups, others because they necessitate subjecting the child to so much temptation that their use was considered objectionable for the present purposes.

Cady[2] set himself the task of finding tests which would yield a measure of the moral traits involved in the adjustment of children to the social and mandatory requirements

[1]Paul Frederick Voelker: *The Function of Ideals and Attitudes in Social Education.* Teachers' College, N. Y., 1921, p. 126.

[2]Vernon S. Cady: *The Estimation of Juvenile Incorrigibility. Journal of Delinquency Monograph* No. 2, 1923, p. 140. Whittier State School, Whittier, Calif. This study was made under the joint supervision of T. L. Kelley, L. M. Terman, and J. Harold Williams.

of the school; that is, measures of incorrigibility. Some of the tests which he tried out, among others, were the following:

1. A test of trustworthiness in following directions in a motor task (dotting circles or tracing mazes with the eyes shut) when there is considerable temptation and opportunity to cheat by "peeping." (Modification of Voelkner's test.)
2. A test of honesty in scoring one's own intelligence test blank in the face of temptation and opportunity to cheat by copying in the correct response from the key while scoring. (Voelker)
3. A test of modesty and accuracy in statements about knowledge possessed. (Modification of Voelker's overstatement test.)
4. A test of moral judgment, in which the subject indicates, by the figures 1, 2, 3, or 4, degrees of blame attaching to each of a number of moral traits. (Modification of Pressey's test.)
5. A modification of the Woodworth questionnaire-test of tendencies likely to be associated with psychopathy or emotional instability.

These tests, which were all suitable for mass use, were given to unselected boys, delinquent boys, and boys specially selected on the basis of several teachers' ratings of boys representing the extremes of corrigibility found among 12 to 14 year olds in the public schools of Fresno, California.

The composite rating secured for the last group had a reliability of .95 and furnished an exceptionally satisfactory criterion for judging the validity of the tests.

Reliability and validity coefficients found for the tests, based upon data from 150 boys of 12 to 14 years, were as follows:

	Reliability	Validity
1. Trustworthiness in motor task	.74	.40
2. Honesty in scoring own test	.58	.19
3. Overstatement	.58	.41
4. Moral judgment	.38	.20 to .31
5. Woodworth questionnaire	.75	.36 to .42
Total weighted score of above	.75	.58

These correlations are lower than are yielded by the best intelligence tests with groups of equal heterogeneity, but they are as high as the correlations given by many achievement tests in common use. They demonstrate, rather conclusively, the value of the test method in the study of character traits.

Raubenheimer arranged a new form of the overstatement test and devised a set of six new tests, all intended to throw light upon tendencies to moral instability. A brief description of each follows:

1. Overstatement, A. This test is a modification of one which had been used by Knight. Fifty book titles were listed on the test blank, 20 of which were fictitious. The score is the number of fictitious titles marked.

The instructions were as follows:

"We want to see who has read the most books. You are to mark a cross on the dotted line in front of every book you have ever read no matter how long ago you read it. After you have finished marking the crosses, count up the number of crosses you have marked. This number will be your score. We want to see who will have the best score. Afterwards we will have you stand up and tell your score. A PERFECT SCORE IS 50. Look at the sample.

Sample: 1. *X* Anderson's Fairy Tales."

Fifteen of the fifty items follow:

.....Robinson Crusoe
.....Little Men
.....Uncle Remus Stories
.....The Underground Patrol
.....White Fang
.....Seaside Adventures
.....Hans Brinker
.....Scouting in Strange Lands
.....Five Little Peppers
.....By England's Aid
.....Call of the Wild
.....Campaigning in Argentina
.....Tom Sawyer
.....Sunk Without a Trace
.....The Friday Murders

Now count up your score and put the number you have read in the space here. Remember, a PERFECT SCORE is 50.

MY SCORE IS.....

2. *Overstatement, B.* This test, which is a modification of a test used by Voelker, consists of two parts. The first part calls for a statement of amount of knowledge the child has in regard to 80 items of information. The second part, given later without warning, tests the child's actual information on these same 80 items. The score is the per cent of overstatement or understatement.[1]

Directions: On the dotted line before each question put 2, 1, or 0 to tell how well you know the thing it asks about. Put down 2 if you know it VERY WELL. Put down 1 if you know it FAIRLY WELL. Put down 0 if you KNOW NOTHING ABOUT IT.

First sample: ..... Can you ride a bicycle?
Second sample: ..... Can you skate on roller skates?
Third sample: ..... Can you drive a car?

Sample items follow:

Do you know who discovered America?
Do you know who wrote "Huckleberry Finn"?
Do you know who was the prophet who spent the night in the lions' den?
Do you know how to find the square root of decimals?
Do you know how many degrees there are on a Centigrade thermometer?
Do you know where Calcutta is?
Do you know what causes an eclipse of the sun?
Do you know what the receiving wires of a wireless are called?
Do you know how water enters the roots of plants?
Now add up your score. A PERFECT SCORE is 160 points.
MY SCORE IS.....

In the second part the subject was told to underline the correct word in such sentences as the following:

America was discovered by Drake Columbus Balboa Cook
"Huckleberry Finn" was written by Alger Dickens Henty Mark Twain
The prophet who spent the night in the lions' den was Daniel Jonah David Joel
The square root of .0081 is .9 .09 .009 9
The number of degrees on a Centigrade thermometer is 32 100 180 212
Calcutta is in India Egypt Siberia Mexico
An eclipse of the sun is caused by the shadow of the earth moon Mars Jupiter
The receiving wires of a wireless are called the amplifiers detectors reflectors antennae

[1]See p. 505 for a description of the scoring method used with the gifted and control groups.

Water enters the roots of plants by capillarity osmosis evaporation solution

3. Questionable reading preferences. The child is asked to place a number from 1 to 10 before each of ten book titles to indicate how well he would like to read the book, 1 meaning greatest preference, 10 least. The score is the sum of the squares of the deviations of the individual items from the correct order as determined by competent judges. Two lists were given, separately. One of them is as follows:

.....A Daring Rescue
.....Roy Black, The Master Thief
.....Captains of Great Teams
.....Hobo Stories
.....Running Away with the Circus
.....The Adventures of Boys Who Became Great Men
.....Summer Camp Adventures
.....With the Gang in the Back Streets
.....The Boy Inventor
.....The Escape Through the Woods

4. Questionable character preferences. This test consists of eight brief paragraphs, each characterizing a boy. The subject is asked to place before each characterization a number from 1 to 8, to show how well he would like to have as a chum the boy described. The test is scored in the same manner as test 3. Two such lists of eight items each are given separately. Four of the items in one list are as follows:

DICK joined the Boy Scouts as soon as he was old enough. He did not like it at first; the drill and the rules were hard. Now he is a troop leader and is planning a camp in the mountains next summer.

RAY STEVENS is at school now, but he is anxious to get out. He wants to become a taxi-driver. Ray says that taxi-drivers have an easy time; they need not work so hard, and they go about a great deal.

TED is a poor boy; and, although he is at school, he must help provide for the family. Ted studies hard and also plays on the team; he wants to become a doctor.

BILL EVANS is fourteen, and is the leader of his gang. He always manages to get his men home safely after they have had a good time around the pool room. Just last week they saw Tom Mix at the movies without paying.

5. Social attitudes. Twenty-four things or ideas were named, each followed by four statements expressing various

kinds of reactions to the thing or idea presented. The subject is asked to check the one statement that most nearly tells how he feels about it. Score is the number of questionable items checked. Samples are as follows:

CHUMS:	.....	It is hard to go without them.
	.....	You cannot always trust them.
	.....	They sometimes squeal on you.
	.....	It is best to have them in your gang.
BOY SCOUTS:	.....	They have too many rules.
	.....	They have to drill too hard; it is no fun.
	.....	They are regular fellows and have lots of fun.
	.....	They are like sissies.
TEACHERS:	.....	They work hard.
	.....	They know they can punish you.
	.....	They are not fair to you.
	.....	They are kind of cranky.
PLAYGROUNDS:	.....	There are always fellows watching you.
	.....	They make you play games you don't like.
	.....	There is no chance to do what you want to.
	.....	You can have a good time there.
POLICEMEN:	.....	They have it in for the kids.
	.....	They are glad to help you out.
	.....	It is fun to fool them.
	.....	They are just big bluffs.
HAVING A PAPER ROUTE:	.....	It gives you a chance to get away from home.
	.....	You can earn some money.
	.....	You have a chance to get round town alone.
	.....	You don't have to be so much with your lessons.

6. Activity preferences. Of three things to do, the subject was to check the one thing he liked best. The test contained twelve items of this nature, the score being the number of items in which some other than the "best" response was checked. This test was not used with the gifted children for fear of possible criticism. It is hardly adapted for use with children of superior social and moral environment. Two of the items are as follows:

A.	.....	Go camping with the Boy Scouts.
	.....	Go around seeing the country, getting lifts as you go.
	.....	Quit school and go with the circus.
B.	.....	Match pennies and win.
	.....	Have a paper route.
	.....	Win money at the shooting gallery.

7. Rating the seriousness of offenses. This is a carefully worked out version of a test which has long been in use. Ten offenses were listed, covering a wide range in nature and seriousness. They had been selected from a much larger number of offenses actually committed by delinquent boys, and they differed from one another in seriousness by equal steps. The subject was to number them from 1 to 10 according to seriousness. The score was the sum of the squares of the deviations from the correct order. This test was finally omitted from the series used with our gifted children; it correlated too highly with intelligence and some of its items were deemed objectionable on moral grounds. Some of the items were as follows:

(b) Sam set fire to the public school which he attended.
(d) Bob ran away from home and got a job, getting his room and board from another family.
(f) Ted played hookey to go to a circus.
(j) Joe entered the house of the people next door and took $2.50.

The derivation of the above tests involved in each case a considerable amount of experimental work which we cannot here enter into.[1] The purpose of the tests was to find whether differences known to exist between two groups with respect to their social and moral adjustments can be detected in a test situation. After a preliminary experiment each test was made up in two forms and the entire battery was given to the following groups of subjects, all boys:

1A. 50 boys in a superior type of school, each selected by the teachers as belonging in the highest quartile of 13 year old boys with respect to reliability, stability, and healthy-mindedness.

1B. 37 boys, 13 years old, in the same school, selected by the teachers as belonging in the lowest quartile with respect to the above traits.

2A. 42 boys, 11 years old, in the same school, corresponding to group A1.

2B. 36 boys, 11 years old, in the same school, corresponding to group A2.

[1]The methods and results are set forth by Dr. Raubenheimer in the following publication: *An Experimental Study of Some Behavior Traits of the Potentially Delinquent Boy.* The Psychological Monographs, 1925.

3A. 43 boys, 13 years old, in the highest quartile in a school of somewhat inferior social status.

3B. 40 boys, 13 years old, in the lowest quartile of this school.

4A. 41 boys, 11 years old, in the highest quartile.

5B. 36 boys, 11 years old, in the lowest quartile.

6. 42 boys of 12 to 14 years in a parental school in the same city (delinquents).

7. 36 boys of 13 to 14 years in the Whittier State School for delinquents.

Both forms of the tests were given to all groups, and in addition, Form B of the National Intelligence Tests. The 13 year olds of groups 1B and 3B combined were used for determining the reliabilities of the tests. In the case of each of the character tests, one form was correlated with the other, and the reliability of the two forms combined was then computed by the use of Brown's formula. The resulting coefficients were as follows:

	Reliability Coefficients
1. Overstatement A, books read	74
2. Overstatement B, knowledge claimed	78
3. Reading preferences	80
4. Social preferences	79
5. Social attitudes	77
6. Activity preferences	74
7. Offense ratings	78
8. National Intelligence scores	86

Table 177 gives for the same 13 year olds the intercorrelations of the tests, the intercorrelations corrected for attenuation (labeled C), and (in parentheses) the corrected intercorrelations found when intelligence is rendered constant by the method of partial correlation.

TABLE 177.

INTERCORRELATIONS OF THE RAUBENHEIMER TESTS

	1 Over-statement A	2 Over-statement B	3 Reading Pref.	4 Social Pref.	5 Social Attitudes	6 Activity Pref.	7 Offense Ratings
2. Over-statement B	.45 (.39) C.36						
3. Reading Preference	.30 C.39 (.31)	.50 .60 (.44)					
4. Social Preference	.14 C.19 (.12)	.33 .40 (.32)	.62 .78 (.77)				
5. Social Attitudes	.19 C.25 (.08)	.38 .46 (.17)	.41 .52 (.31)	.35 .45 (.39)			
6. Activity Preference	.10 C.13(−.06)	.39 .49 (.05)	.36 .47 (.26)	.40 .52 (.47)	.56 .74 (.54)		
7. Offense Ratings	.25 C.33 (.19)	.50 .61 (.08)	.27 .34(−.03)	.10 .12 (−01)	.49 .63 (.17)	.23 .30(−.37)	
8. National Intelligence	.22 C.28	.64 C.75	.38 C.46	.22 C.26	.58 C.72	.49 C.62	.63 C.77

The above intercorrelations show that the tests do not duplicate one another greatly, and that they are measuring something which is not identical with the traits measured by the National Intelligence Tests. However, tests 2, 5, 6, and 7 correlate rather more highly with intelligence than would be desirable. It was later found possible to reduce this defect of Test 2 by the use of a different method of scoring.

Bi-serial *r* coefficients were computed to show the efficiency of the several tests differentiating between the following groups:

1A and 1B (highest and lowest 13 year olds in the better school).

2A and 2B (highest and lowest 11 year olds in the good school).

3A and 3B (highest and lowest 13 year olds in the poorer school).

4A and 4B (highest and lowest 11 year olds in the poorer school).

1A and parental school group.
2A " " " "
3A " " " "
4A " " " "

Nearly all of these coefficients were large enough to be significant but were lower for the first four comparisons listed above than for the last four. It appears that the upper and lower quartiles of unselected children did not give very widely contrasting groups in the schools used; teachers frequently complained that many of the pupils they had to offer for the low group were hardly less reliable, stable, and healthy-minded than their best pupils. On the other hand, each of the high quartile groups yielded a striking contrast to the parental school group, which, judged by the scores earned, was the worst group tested. The Whittier group of committed delinquents held an intermediate position, possibly because of the exceptionally favorable influences to which they had been subjected in the school. The bi-serial *r's* for the A groups and the parental school group were as follows:

	Parental School versus			
	1A Age 13	2A Age 11	3A Age 13	4A Age 11
1. Overstatement A	.41	.45	.31	.37
2. Overstatement B	.63	.48	.47	.32
3. Reading preferences	.54	.26	.60	.40
4. Social preferences	.28	.25	.41	.16
5. Social attitudes	.67	.59	.73	.41
6. Activity preferences	.61	.39	.61	.36
7. Offense ratings	.31	.24	.26	–.11
Total Weighted Score	.72	.55	.74	.47

The correlation of total weighted score with the criterion ranges, therefore, from .47 to .74, with an average of .62 for the four comparisons. It is higher for the 13 year than for the 11 year groups, probably because there is an average difference of more than a year and a half in the mental ages of the 13 year and parental school pupils, whereas the 11 year olds are of about the same mental age as the parental school subjects.

The means and S.D's of total scores for the different groups were as given below. Attention is called to the fact

that because of the method of scoring, low scores are "better" than high scores.

	M	S.D.
High 13 year olds, good school	100	67.6
Low " " " " "	111	67.9
High " " " poorer "	101	72.6
Low " " " " "	156	87.0
High 11 " " good "	124	71.7
Low " " " " "	149	87.3
High " " " poorer "	137	76.3
Low " " " " "	186	87.8
Parental school pupils	196	72.8

Table 178 shows the difference between each A group and the parental school group expressed as a multiple of its standard deviation. It will be noted that the differences are significant in nearly all the comparisons, and that for the total score they are very large.

TABLE 178.

DIFFERENCES BETWEEN MEANS OF VARIOUS GROUPS IN THE RAUBENHEIMER TESTS

(Expressed as multiples of the S.D's of the differences)

	13 year olds		11 year olds	
	1A vs. parental	2A vs. parental	3A vs. parental	4A vs. parental
1. Overstatement A	3.41	2.57	3.85	3.16
2. Overstatement B	5.75	3.91	3.98	2.46
3. Reading preferences	4.77	5.38	1.95	2.92
4. Social preferences	2.27	3.44	1.94	1.22
5. Social attitudes	6.34	7.54	3.30	3.40
6. Activity preferences	5.55	5.76	3.19	2.94
7. Offense ratings	2.62	2.09	1.97	0.83
Total weighted score	6.52	6.03	4.56	3.60

SELECTION OF CHARACTER TESTS FOR THE GIFTED GROUP

In the selection of tests for the gifted group from those which had been devised by Cady and Raubenheimer, other factors than reliability and validity had to be considered. Cady's test of honesty in recording scores, although an excellent test, was omitted on the ground that it might be deemed morally objectionable by parents or teachers. Raubenheimer's tests of activity preferences and offense ratings were omitted for the same reason, and for the additional

reason that they were thought to differentiate less effectively in the upper moral levels than in the lower. They also correlated rather too highly with intelligence. Cady's test of moral judgment was omitted because of its low reliability and low validity, and because it had been shown to correlate too highly with intelligence.

The following battery of tests was finally selected:

1. Overstatement, A (Knight-Raubenheimer).
2. Overstatement, B, Part I (Voelker-Cady-Raubenheimer).
3. Reading preferences (Raubenheimer).
4. Character preferences(Raubenheimer).
5. Social attitudes (Raubenheimer).
6. Trustworthiness in following directions (Voelker-Cady).
7. Questionnaire-test of emotional instability (Woodworth-Cady).

Description of Test 6 (Trustworthiness)

This test was given with minor departures from the procedures laid down by Cady. The directions were as follows:

Circles. "Here is a test to see how well you can use your hands with your eyes shut." E. points to a blank (see Figure 28), which should be pinned up on wall in plain view of all, and says, "See these circles (pointing), numbered 1, 2, 3, 4, 5. You are to lay the paper flat on your desk and hold it here, with the fingers of the left hand (E. points to place). Then take your pencil in the other hand and put the point down at the cross where it says 'start here.' Next look carefully at the circles numbered 1, 2, 3, 4, and 5, to see where they are. Then when I say, 'go' you must shut your eyes so that you can not see and try to make a *cross,* with your pencil, in each one of the five circles. There will be five trials, and after each trial we will see who gets the most crosses in the little circles. Some people get nearly all of them in. Watch me: (E. demonstrates, with butt of pencil, taking care *not to miss* any of the circles).

"You are to do it the same way, but with your eyes shut. Shut them when I say 'Go'."

Pupils are requested to sit up straight, hold paper squarely on desk before them, and place pencil down at cross. "Now look carefully to see where the circles are." After 10 seconds, "Go."

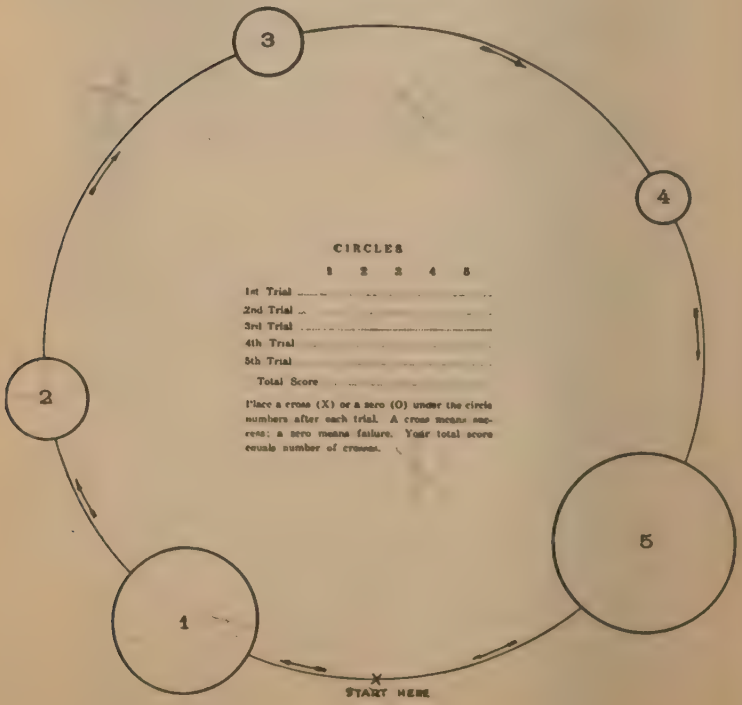
Five trials with same sheet. After each trial children record scores as per instructions at center of the sheet. After each trial E. says:

"How many got the cross in all five circles?"
"How many got it in two or three circles?"
"How many did not get it in any?"

Squares. "Here is another test a little like the other. (Examiner demonstrates, with a blank [see Figure 29] pinned up in view.) You hold the paper with your fingers here, you put the pencil here (E. puts pencil at cross in largest square). You look carefully at the biggest square, then you shut your eyes and make a line with your pencil clear around the square without touching the sides." (E. does it.)

"Next you start here (E. puts pencil down at cross of next largest square), shut your eyes, and make a line clear around the next square, only this time you go the other direction. Then you start

FIGURE 28.
CIRCLES USED IN TRUSTWORTHINESS TEST
(Reduced)

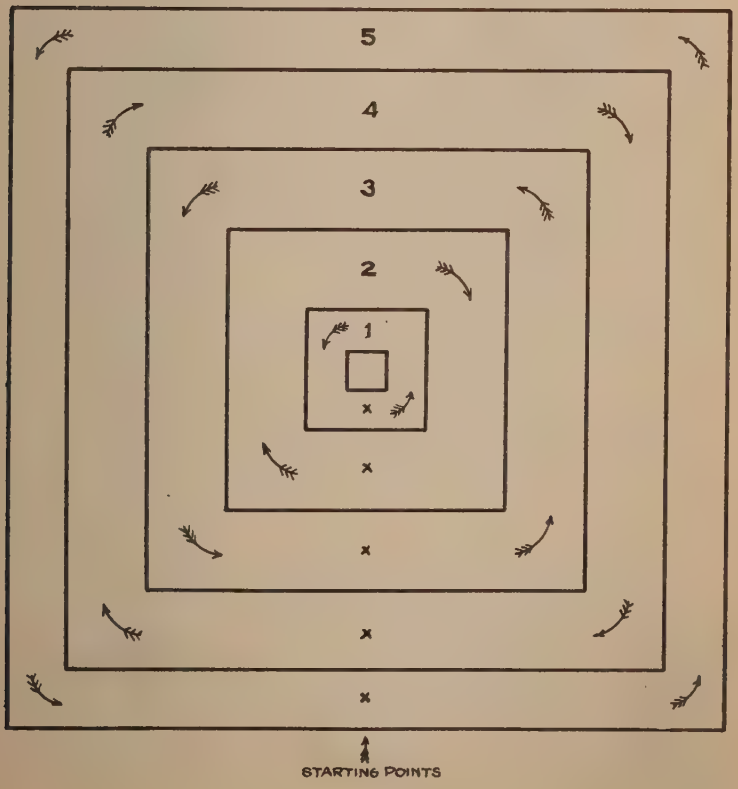


here and make a line clear around the next square. (E. does it.) Each time you must change and go the other direction."

Pupils are told to sit up straight, to hold paper squarely on the desk before them, and to place pencil down at cross. "Now look carefully to see where you are to make the line." After 10 seconds, "Go."

After each trial say: "How many got clear around without touching the sides more than just a little?"

FIGURE 29.
SQUARES USED IN TRUSTWORTHINESS TEST
(Reduced)



Scoring of Trustworthiness Test

Cady scored each complete performance with the circles as + or —, according as there was or was not evidence that the subject had cheated; similarly with the squares. We have used, instead, a graded score, derived as follows:

Circles:

Number of crosses in Circle					2	multiplied by		3
"	"	"	"	"	3	"	"	4
"	"	"	"	"	4	"	"	5

Circles 1 and 5 are ignored, as crosses may frequently be placed in these without cheating.

Squares:

Ignore the smallest square. For each of the other squares the score is obtained as follows:

Score 1 for each *corner* (except the first) where the line drawn is within the boundary lines. In addition give 1 if the entire line is within the boundaries (does not actually cross the line). This makes a possible unweighted score of 4 for each square. These scores are then weighted in the following manner:

Score on Square			2	is	to be multiplied by		2
"	"	"	3	"	"	"	3
"	"	"	4	"	"	"	4
"	"	"	5	"	"	"	6

Total score of the test equals sum of score on squares and circles.

Description of Test 7 (Woodworth-Cady Questionnaire)

This test was devised by Woodworth in 1918 for use in identifying soldiers having psychotic tendencies. In arranging it the author sifted the leading manuals of psychiatry, made a list of the symptoms most generally agreed upon by competent authorities as being frequently associated with psychopathy, and embodied as many of these symptoms as possible in questions to be answered by yes or no. The war came to an end before the validity of the test could be thoroughly established, but it was given to one regiment and to several groups of normal and psychopathic subjects. With a

group of subjects in a private hospital for nervous patients it yielded scores which overlapped only slightly those earned by normal subjects.

In its original form the questionnaire, because of items it contained relating to sex, was not suitable for use with school children. It was later expurgated and revised by Ellen Matthews, who then gave it in the revised form to 1,133 unselected school children and to 376 other children, and made a detailed analysis of the responses to individual items and revised the test.[1] Cady made a number of additional changes based upon the extent to which individual items differentiated children rated by other criteria as superior or inferior in emotional stability. He also arranged it in two forms in order to determine its reliability. In one form the questions were of a positive type throughout; in the second form they were of a negative type. For example, Form A contains the question, "Do you always get on well with your teachers or principal?" In Form B this items runs, "Do you often have trouble with your teachers or principal?" We have given only Form A, and this with slight alterations. Two or three items were omitted because they were considered objectionable; for example, the question, "Do you feel that your parents are not really your own?" Certain changes were also made in the "padding"; that is, in the items inserted merely to lull the suspicions of the subject as to the purpose of the test. Finally, small changes were made in the wording of a few of the significant items. We reproduce the entire list as it was given to the gifted and control groups. The starred items only are scored.

Directions:

"Look at the directions, here, (pointing). It says: 'Answer every question as truthfully and honestly as you can by drawing a line under the right answer, as shown in the samples.'"

"First sample: 'Are there seven days in a week?' The right answer is yes, so the word yes has a line under it."

"Second sample: 'Do you sleep 15 hours a day?' All of you draw a line under yes or no to tell whether you sleep 15 hours a day." (Pause.)

"Below are other questions. Answer every one truthfully and honestly by drawing a line under yes or no. Do not skip any. Go."

[1] A Study of Emotional Stability in Children. *The J. of Delinquency*, Vol. VIII, Jan., 1923, pp. 1–40.

Allow all, or practically all, to finish. Exceptionally slow pupils may be urged to go faster.

Scoring:

The score is the number of starred items answered correctly. The "correct" answers are underlined in the following reproduction of the test.

1. *Are you happy most of the time?	YES	NO
2. *Are you afraid in the dark?	YES	NO
3. *Do you get tired of people easily?	YES	NO
4. *Are you anxious to get away from school and get a job?	YES	NO
5. *Have you often fainted away?	YES	NO
6. Were you ever fond of playing with snakes?	YES	NO
7. *Did you ever have a nick-name you didn't like very well?	YES	NO
8. *Do you usually enjoy your meals?	YES	NO
9. *Can you usually sit still without fidgeting?	YES	NO
10. *Do people say you are disobedient?	YES	NO
11. *Do you usually sleep well?	YES	NO
12. Can you keep still when you are being tickled?	YES	NO
13. *Do you make friends easily?	YES	NO
14. *Did you ever run away from home?	YES	NO
15. *Have you the habit of biting your finger nails?	YES	NO
16. *Does the thought of hurting a person or animal give you pain?	YES	NO
17. *Do your eyes often pain you?	YES	NO
18. Do you prefer to go without your breakfast?	YES	NO
19. *Would you rather play by yourself than with someone?	YES	NO
20. *Do you ever dream of robbers?	YES	NO
21. *Did you ever have the habit of twitching your head, neck, or shoulders?	YES	NO
22. *Do your teachers tell you that you are too noisy or talk too much?	YES	NO
23. *Do you hear easily when spoken to?	YES	NO
24. Do you prefer rainy weather?	YES	NO
25. *Do you sometimes cry yourself to sleep?	YES	NO

26. *Do you mind crossing a bridge over water? YES NO
27. *Do you ever have the same dream over and over? YES NO
28. *Do you like to tease people till they cry? YES NO
29. *Do you get out of breath quickly when you run? YES NO
30. Would you like to go to school on Saturdays? YES NO
31. *Do your teachers generally treat you right? YES NO
32. *Can you stand the sight of blood? YES NO
33. *Are you troubled with dreams about your play? YES NO
34. *Were you ever expelled from school, or nearly expelled? YES NO
35. *Do you usually feel well and strong? YES NO
36. Do you refuse candy when it is offered you? YES NO
37. *Have you often been punished unjustly? YES NO
38. *Do you have a great fear of fire? YES NO
39. *Do you often get cross over little things? YES NO
40. *Have you ever been arrested, fined, or placed on probation? YES NO
41. *Do things ever seem to get misty before your eyes? YES NO
42. Do you like to have people hurry you when you are working? YES NO
43. *Do you like to be praised and made much of? YES NO
44. *Can you stand as much pain as others can? YES NO
45. *Do you giggle a good deal and find you cannot help it? YES NO
46. *Do you always get on well with your teachers or principal? YES NO
47. *Do you have many bad headaches? YES NO
48. Is it easy for you to get up as soon as you awaken in the morning? YES NO
49. *Did you ever feel that you were very wicked? YES NO
50. *Do you know anybody who is trying to do you harm or hurt you? YES NO
51. *Are you ever bothered by a feeling that things are not real? YES NO
52. *Would you like to wear expensive jewelry, rings, etc.? YES NO
53. Have you always remembered to clean your teeth? YES NO
54. *Do you live a make-believe life, in addition to your real life? YES NO

55. *Does it make you uneasy to cross a wide street or open square? YES NO
56. *Do you feel sort of tired a good deal of the time? YES NO
57. *Do those you play with say you quarrel or fight too much? YES NO
58. Do you dislike to ride in automobiles? YES NO
59. *Do you ever feel that no one loves you? YES NO
60. *Do you think you have more fears than most people? YES NO
61. *Do you sometimes worry about your health? YES NO
62. *Do you enjoy being idle and lounging about? YES NO
63. Does the odor of most flowers make you sick? YES NO
64. *Do you think that people are always looking at you or making remarks about you? YES NO
65. *Do you have to have a light in your room at night before you can go to sleep? YES NO
66. *Do your folks say that you walk in your sleep? YES NO
67. *Do people find fault with you much? YES NO
68. Would you be afraid to ride on horseback? YES NO
69. *Do other children of your age usually let you play with them? YES NO
70. *Are you often frightened in the middle of the night? YES NO
71. *Do you often have a hard time making up your mind about things? YES NO
72. *Do you find school a hard place to get along in? YES NO
73. *Are your feelings often hurt so badly that you cry? YES NO
74. *Is there any kind of food that disgusts you so that you cannot eat it? YES NO
75. *Did you ever have the habit of stuttering or stammering? YES NO
76. *Can you do good work while people are looking at you? YES NO
77. *Do you ever dream of people being dead? YES NO
78. *Can you handle yourself well in walking and running? YES NO
79. *Do you sometimes wish you had never been born? YES NO
80. *Would you rather be with grown people than with those of your own age? YES NO
81. *Do you have trouble in getting to sleep? YES NO

82. *Do you ever imagine stories to yourself so that you forget where you are? YES NO
83. *Do you feel like jumping off when you are on a high place? YES NO
84. *Do you think people like you as much as they do other people? YES NO
85. *Do you feel that you are getting a square deal in life? YES NO

Scoring of Overstatement B

A new method had to be devised for scoring the overstatement test, as the method used by Raubenheimer yielded a score which was considerably influenced by the factor of intelligence. The method substituted was as follows:

(a) Part I, child's statement of knowledge, score = number of items marked 2. (Omitting the 1's was found to increase the reliability).

(b) Part II, score = $2(R - \frac{1}{3}W)$, where R = number of items answered correctly and W the number marked wrongly.

(c) Final score,

for overstatement: $\frac{I - II}{80 - II}$

for understatement: $\frac{II - I}{II}$ where I = score on Part I, II = score on Part II, and 80 = total possible score for the 40 items. The method takes account of the fact that a child can overstate only with reference to the items which he does not know, and that he can understate only with reference to the items which he does know.

Subjects Tested

The above tests were given to the following gifted and control subjects:

	Gifted			Control		
Age	Boys	Girls	Total	Boys	Girls	Total
7 and 8	18	23	41	—	—	—
9	14	36	77	—	—	—
10	51	41	92	46	46	92
11	64	43	107	60	47	107
12	55	51	106	56	66	122
13	37	34	71	56	77	133
14[1]	18	20	38	40	39	79
Total	284	248	532	258	275	533

[1]The gifted group contained 3 boys and 6 girls of the ages 15 and 16. These were classified with the 14 year olds.

The control group (Control Group D) was the same as that used in connection with the test of intellectual, social, and activity interests. It was composed of unselected pupils in grades 4 to 8 in two schools of San Jose, California. All the pupils in grades 4 to 8 of these schools were tested, but those of age 15 and over were omitted from the calculations.

The tests were given in the following order:

1. Overstatement A
2. Overstatement B, Part I
3. Reading preferences
4. Character preferences
5. Social attitudes

(Brief recess)

6. Trustworthiness (squares and circles)
7. Overstatement B, Part II
8. Woodworth-Cady questionnaire.

With the following exceptions two forms of tests, 1 to 7, were given to both the gifted and control groups:

(a) The control group was given only one form of Test 5. In order to make the results on this test comparable with those of the gifted group, which took both forms, a theoretical score on the two forms was computed for the children of the control group. The formula used was as follows:

$$\frac{\text{Mean for total of both forms, gifted group}}{\text{Mean for one form, gifted group}} \times \text{Score for one form, control}$$

This assumes for children of both groups the same ratio of gain from the first form to the second form.

(b) Test 2 also was given to the control group only in one form (40 items instead of 80). Both forms were given to the gifted group, but the second form was omitted in scoring. A single form of this test has a fairly high reliability.

Derivation of Total Score

The total score includes the score on the Woodworth-Cady questionnaire. Although this test is intended primarily to bring to light abnormal emotional tendencies, while all the other tests are more specifically directed toward the measurement of moral traits, Cady's results indicate that

emotional instability is probably an important factor in the total complex of traits making for moral deviation. In weighting the tests to secure a total score the following factors were taken into account: reliability, validity as shown by correlation with criterion, variability, and average intercorrelation with the other tests. Other things equal, the weight given should vary directly with reliability and validity, and inversely with variability and average intercorrelation. Possible vitiation of the results by the factor of intelligence was also taken into account. One would expect the brightest children to be more likely to divine the purpose of the tests, with the result that their responses would be less spontaneous and less genuine than those of average or intellectually inferior children. Raubenheimer questioned each of his groups, after the examination was over, to find whether they had understood the purpose of the tests. The replies indicated that probably fewer than 5 per cent of the children, even in the 13 year groups, had guessed correctly. It appears that for the large majority of unselected children the tests are not invalidated by this factor. In the case of our highly selected gifted group the vitiation of results from this source may be, and probably is, greater, especially with tests 3, 4, and 5. The factor of dissimulation is pretty effectually ruled out in tests 2 and 6, and is believed not to affect seriously tests 1 and 7.

Two judges (Terman and Goodenough), with the above factors in mind, weighted the tests independently of each other. Their combined judgments yielded the following weights which were therefore used in obtaining the total score:

1. Overstatement A	1
2. Overstatement B	1
3. Reading preferences	0.1
4. Character preferences	0.1
5. Social attitudes	5
6. Trustworthiness in following directions	1
7. Woodworth-Cady questionnaire	2

Comparison of Gifted and Control Groups

Tables 179 to 186 give for each test and for the total score, by age and sex, the means and S.D's of gifted and control groups, the difference between the means, the S.D. of the difference, and the difference expressed as a multiple of its S.D. Attention is called to the fact that the scores of the 7, 8, and 9 year old gifted children are compared with the 10 year norm of the control. It was not possible to extend the norms lower than ten years, as unselected children below that age are frequently unable to understand and carry out the instructions. Since most of the tests show more or less increase in mean score with age, the method of comparison used is somewhat unfair to the gifted children below 10 years. Attention is again called to the fact that low scores are "better" than high scores.

Table 179.

Comparison of Means, Test 1, Overstatement A

Age	M Gifted	M Control	S.D. Gifted	S.D. Control	Diff. bet. Means	S.D. of Diff.	Diff. / S.D. of Diff.
Boys 7 and 8	1.17	*	0.96	*	1.72	0.73	2.35
9	2.95	*	4.96	*	–0.06	1.04	0.06
10	2.71	2.89	4.70	4.74	0.18	0.96	0.19
11	1.73	3.65	3.11	4.95	1.92	0.75	2.56
12	1.00	2.98	2.20	5.21	1.98	0.76	2.62
13	2.87	2.61	4.58	4.01	–0.26	0.92	0.28
14	2.11	2.10	3.04	3.80	–0.01	0.93	0.01
Total boys	2.03	3.38	3.90	4.47	1.35	0.36	3.75
Girls 7 and 8	2.78	*	4.56	*	1.22	1.27	0.96
9	1.11	*	2.73	*	2.89	0.96	3.02
10	2.76	4.00	4.98	5.71	1.24	1.16	1.08
11	1.00	3.26	1.93	5.21	2.26	0.82	2.77
12	1.31	2.36	2.41	3.96	1.05	0.59	1.77
13	1.79	1.92	3.93	3.62	0.13	0.79	0.16
14	0.80	2.56	2.18	3.07	1.76	0.80	2.20
Total girls	1.63	2.70	3.46	3.65	1.07	0.31	3.45
Sexes combined	1.85	2.80	3.71	4.57	0.95	0.26	3.75

* Comparison based upon 10-year mean of control group.

TABLE 180.

COMPARISON OF MEANS, TEST 2, IN TERMS OF PER CENT OF OVERSTATEMENT

(Negative scores signify understatement)

Age	M Gifted	M Control	S.D. Gifted	S.D. Control	Diff. bet. Means	S.D. of Diff.	Diff. / S.D. of Diff.
Boys 7 and 8	–8.0	*	27.6	*	28.9	8.02	3.59
9	3.8	*	30.8	*	17.1	6.74	2.52
10	6.0	20.9	29.7	31.3	14.9	6.35	2.33
11	8.7	20.3	30.3	24.8	11.6	4.96	2.32
12	2.5	12.7	25.5	26.6	10.2	2.95	2.08
13	9.7	14.0	29.4	29.1	4.3	6.21	0.70
14	3.7	11.1	22.8	24.4	7.4	6.61	1.12
Total boys	5.2	18.1	29.4	28.6	12.9	2.50	5.16
Girls 7 and 8	13.6	*	23.7	*	3.9	5.95	0.65
9	–10.2	*	26.4	*	27.7	5.41	4.93
10	–2.2	17.5	30.3	20.8	19.7	5.67	3.47
11	–4.4	12.3	24.9	26.0	16.7	5.37	3.11
12	–0.9	10.6	24.5	24.2	11.5	4.54	2.53
13	–2.0	12.8	25.5	30.3	14.8	5.59	2.64
14	–11.3	15.2	18.7	29.5	26.5	5.32	4.19
Total girls	–2.8	16.0	26.0	26.5	18.8	2.31	8.14
Sexes combined	1.5	15.7	28.0	27.8	14.2	1.72	8.30

* Comparison based upon 10-year mean of control group.

TABLE 181.

COMPARISON OF MEANS, TEST 3, BOOK PREFERENCES

Age	M Gifted	M Control	S.D. Gifted	S.D. Control	Diff. bet. Means	S.D. of Diff.	Diff. / S.D. of Diff.
Boys 7 and 8	530	*	203	*	13	56.0	0.24
9	507	*	279	*	36	52.3	0.69
10	441	543	265	195	102	47.1	2.17
11	343	505	244	270	162	46.1	3.52
12	320	515	281	265	195	51.6	3.79
13	344	564	285	299	220	61.1	3.61
14	199	544	226	280	345	69.3	4.98
Total boys	383	516	276	219	133	21.3	6.24
Girls 7 and 8	526	*	182	*	16	50.8	0.31
9	421	*	242	*	121	52.3	2.31
10	344	542	235	219	198	49.1	4.04
11	305	445	261	256	140	54.5	2.56
12	296	435	263	261	139	49.2	2.89
13	184	434	189	250	250	43.1	5.80
14	244	416	229	214	172	62.2	2.76
Total girls	325	473	254	260	148	22.62	6.54
Sexes combined	355	488	268	266	133	16.4	8.09

* Comparison based upon 10-year mean of control group.

TABLE 182.

COMPARISON OF MEANS, TEST 4, CHARACTER PREFERENCES

Age	M Gifted	M Control	S.D. Gifted	S.D. Control	Diff. bet. Means	S.D. of Diff.	Diff. / S.D. of Diff.
Boys 7 and 8	489	*	261	*	74	70.3	1.06
9	379	*	297	*	184	57.6	3.19
10	254	563	198	262	309	47.5	6.51
11	219	366	170	286	147	42.3	3.48
12	171	308	136	237	137	37.2	3.67
13	136	371	93	273	235	39.6	5.93
14	156	243	97	152	87	28.7	3.07
Total boys	241	340	213	267	99	20.1	4.93
Girls 7 and 8	426	*	332	*	34	80.0	0.42
9	229	*	139	*	231	41.3	5.58
10	223	460	150	260	237	44.9	5.27
11	171	422	105	220	251	35.8	7.01
12	142	336	117	239	194	33.7	5.76
13	102	237	61	199	135	25.0	5.38
14	125	193	134	159	68	36.4	1.86
Total girls	193	311	148	222	118	16.03	7.36
Sexes combined	219	329	199	259	110	13.8	7.98

* Comparison based upon 10-year mean of control group.

TABLE 183.

COMPARISON OF MEANS, TEST 5, SOCIAL ATTITUDES

Age	M Gifted	M Control	S.D. Gifted	S.D. Control	Diff. bet. Means	S.D. of Diff.	Diff. / S.D. of Diff.
Boys 7 and 8	9.76	*	5.70	*	2.50	1.63	1.53
9	4.05	*	4.03	*	8.21	1.07	7.65
10	2.57	12.26	3.12	5.90	9.69	0.97	9.96
11	2.13	7.52	3.02	6.04	5.39	0.86	5.55
12	1.59	5.96	1.96	4.64	4.37	0.67	8.85
13	1.05	6.50	1.32	5.56	5.45	0.77	6.43
14	1.33	6.10	1.49	4.94	4.77	0.86	5.57
Total boys	2.74	7.24	3.64	5.96	4.50	0.43	10.47
Girls 7 and 8	4.91	*	3.94	*	3.51	1.20	2.92
9	1.31	*	1.29	*	7.11	0.90	7.91
10	1.26	8.42	1.65	5.87	7.16	0.91	7.84
11	0.88	7.47	1.17	6.02	6.59	0.90	7.35
12	0.92	4.82	1.06	4.96	3.90	0.63	6.15
13	1.15	4.87	1.50	4.71	3.72	0.60	6.22
14	0.65	4.23	1.19	2.57	3.58	0.49	7.31
Total girls	1.51	5.30	1.99	5.40	3.79	0.35	10.83
Sexes combined	2.17	6.24	3.05	5.76	4.07	0.28	14.41

* Comparison based upon 10-year mean of control group.

TABLE 184.

COMPARISON OF MEANS, TEST 6, TRUSTWORTHINESS

Age	M Gifted	M Control	S.D. Gifted	S.D. Control	Diff. bet. Means	S.D. of Diff.	Diff. / S.D. of Diff.
Boys 7 and 8	33.7	*	40.3	*	23.2	11.98	1.94
9	42.4	*	38.2	*	14.5	9.43	1.54
10	28.4	56.9	32.9	39.9	28.5	8.65	3.29
11	26.7	50.2	26.2	36.3	23.5	5.75	4.08
12	24.6	34.0	22.5	29.9	9.4	5.12	1.84
13	31.9	41.2	37.9	33.1	9.3	7.86	1.19
14	34.5	31.7	30.9	23.5	–2.8	8.33	–0.34
Total boys	31.2	43.6	31.9	34.1	12.4	2.92	4.25
Girls 7 and 8	37.2	*	36.6	*	13.4	9.58	1.39
9	36.0	*	36.7	*	14.6	8.42	1.72
10	44.0	50.6	33.5	38.7	6.6	7.71	0.85
11	31.8	59.7	34.3	36.7	27.9	7.61	3.68
12	32.8	41.8	30.2	32.4	9.0	5.92	1.51
13	37.1	38.0	31.0	34.6	0.9	7.29	0.12
14	24.8	27.7	24.8	29.7	2.9	7.81	0.37
Total girls	35.6	43.9	33.2	35.9	8.3	3.17	2.62
Sexes combined	33.3	43.8	32.6	35.0	10.5	2.15	3.87

* Comparison based upon 10-year mean of control group.

TABLE 185.

COMPARISON OF MEANS, TEST 7, WOODWORTH-CADY QUESTIONNAIRE

Age	M Gifted	M Control	S.D. Gifted	S.D. Control	Diff. bet. Means	S.D. of Diff.	Diff. / S.D. of Diff.
Boys 7 and 8	13.1	*	7.17	*	5.3	5.31	2.16
9	12.2	*	7.74	*	6.2	2.16	2.91
10	12.1	18.4	6.67	12.10	6.3	2.01	3.12
11	11.8	16.0	6.40	10.61	4.2	1.59	2.66
12	12.5	15.1	6.84	9.25	2.6	1.54	1.68
13	10.1	15.6	10.20	9.22	5.5	2.08	2.64
14	7.9	15.6	4.87	7.27	7.7	1.62	4.69
Total boys	11.8	16.2	6.80	9.36	4.4	0.71	6.11
Girls 7 and 8	12.8	*	6.94	*	5.9	1.87	3.17
9	9.8	*	7.39	*	8.9	1.70	5.21
10	10.9	18.7	8.03	7.99	7.8	1.72	4.56
11	10.4	16.6	7.19	7.62	6.2	1.56	3.97
12	10.4	15.0	7.41	7.93	4.6	1.43	3.21
13	11.9	15.3	5.91	8.01	3.4	1.36	2.54
14	10.7	15.6	5.67	8.08	4.9	1.91	2.54
Total girls	11.0	16.1	7.09	8.19	5.1	0.67	7.61
Sexes combined	11.4	16.1	6.95	8.78	4.7	0.48	9.70

* Comparison based upon 10-year mean of control group.

TABLE 186.

COMPARISON OF MEANS, TOTAL SCORE OF CHARACTER TESTS

Age	M Gifted	M Control	S.D. Gifted	S.D. Control	Diff. bet. Means	S.D. of Diff.	Diff. / S.D. of Diff.
Boys 7 and 8	224.5	*	85.25	*	52.3	26.50	1.97
9	185.8	*	93.73	*	91.0	21.49	4.32
10	144.0	276.8	67.83	98.28	132.8	18.44	7.20
11	131.1	228.3	68.53	91.53	97.2	14.76	6.59
12	113.4	196.3	63.00	77.78	82.9	14.07	5.90
13	122.8	208.4	63.25	94.80	85.6	17.80	4.81
14	91.4	183.2	56.38	73.85	91.8	18.76	4.89
Total boys	139.8	219.3	78.45	93.34	79.5	7.81	10.19
Girls 7 and 8	202.8	*	81.98	*	37.0	23.04	1.61
9	130.8	*	62.80	*	109.0	17.44	6.25
10	133.9	239.8	56.10	80.73	105.9	16.06	6.59
11	106.6	241.4	59.88	108.90	134.8	18.68	7.22
12	108.9	185.8	65.00	80.93	76.9	14.73	5.22
13	99.9	154.0	52.98	89.08	54.1	15.94	3.40
14	79.5	145.4	57.08	75.63	65.9	19.16	3.44
Total girls	118.8	194.1	68.00	96.77	75.3	7.91	9.52
Sexes combined	130.2	205.8	74.63	95.90	75.6	5.63	13.44

* Comparison based upon 10-year mean of control group.

It is possible to summarize the above tables very briefly. The differences between the two groups are large enough at nearly all ages to be highly significant. In the case of Test 1 the differences are significant at only part of the ages. In the total score of the seven tests the difference is very large at all ages.

In the gifted group, girls are significantly superior to boys in most of the tests, while in the control group the sex difference is much smaller. However, in both groups boys do better than girls in the test of trustworthiness (circles and squares). The detailed results on sex differences are as follows:

1. Overstatement A. No sex difference.

2. Overstatement B. Gifted girls are much superior to gifted boys, and tend to understate rather than overstate. Control girls are only slightly superior to control boys.

3. Book preferences. Girls are superior to boys in both groups.

4. Character preferences. Gifted girls are superior to gifted boys. No marked sex difference in the control group.

5. Social attitudes. Gifted girls are superior to gifted boys at all ages except 13, and control girls are superior to control boys at all ages except 11.

6. Trustworthiness. In both gifted and control groups the boys make a better showing than the girls in five out of seven age comparisons.

7. Woodworth-Cady questionnaire. Gifted girls do slightly better than gifted boys, while in the control group there is no significant sex difference.

Tables 187 and 188 give other forms of comparison between the two groups. In general, from 60 to 85 per cent of the gifted equal or exceed the mean score of the control group. The high per cent for Test 5, Social Attitudes, may be partly spurious, as this test may be vitiated by the fact that children of superior intelligence tend to be more on their guard. However, tests 2 and 6 (Overstatement B and Trustworthiness), in which this factor could hardly have entered, show, respectively, about 70 per cent and 60 per cent of the gifted at or above the mean of the control group. The order of the tests with respect to degree of superiority of the gifted over the control group (Table 188) is as follows:

Boys	Girls
Test 5. Social Attitudes	Test 5. Social Attitudes
Test 4. Character Preferences	Test 4. Character Preferences
Test 3. Book Preferences	Test 3. Book Preferences
Test 6. Trustworthiness	Test 7. Woodworth-Cady Ques.
Test 7. Woodworth-Cady Ques.	Test 2. Overstatement B
Test 2. Overstatement B	Test 6. Trustworthiness
Test 1. Overstatement A	Test 1. Overstatement A

TABLE 187.

FURTHER COMPARISON OF GIFTED AND CONTROL GROUPS IN TESTS 1 AND 2 OVERSTATEMENT A AND OVERSTATEMENT B

Age	Per cent showing zero overstatement in Test 1		Per cent overstating 10% or more in Test 2	
	Gifted	Control	Gifted	Control
Boys 7 and 8	*72	—	33	—
9	*51	—	39	—
10	53	52	39	68
11	49	47	44	73
12	68	48	35	59
13	42	43	46	64
14	33	50	33	63
Total	53	48	40	66
Girls 7 and 8	*52	—	73	—
9	*64	—	28	—
10	61	48	34	66
11	58	49	26	70
12	59	50	29	62
13	56	48	41	67
14	80	36	15	56
Total	61	47	34	65
Sexes combined	57	47	37	65

* Comparison with 10-year control group.

TABLE 188.

PER CENT OF GIFTED WHO EQUAL OR SURPASS THE MEAN OF THE CONTROL GROUP IN TESTS 1 TO 7 AND IN TOTAL SCORE[1]

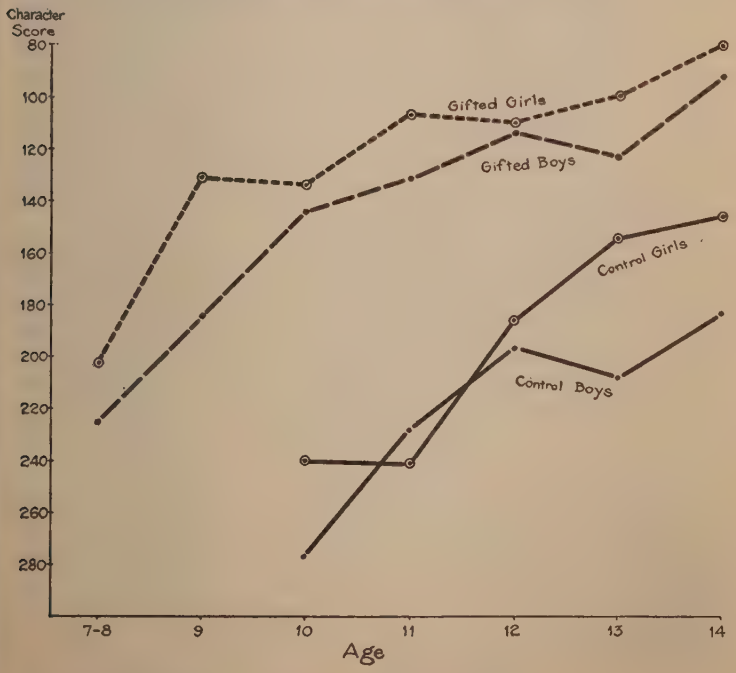
Age	Test 1 Over-state-ment A	Test 2 Over-state-ment B	Test 3 Book Prefer-ences	Test 4 Char-acter Prefer.	Test 5 Social Atti-tudes	Test 6 Trust-worth-iness	Test 7 Wood-worth Cady	Total Score Tests 1 to 7
Boys 10	51	68	70	88	95	76	70	91
11	65	68	73	69	81	74	65	85
12	65	65	77	72	83	62	61	86
13	48	55	77	80	84	61	72	82
Average Per Cent	57	63	74	77	86	68	67	86
Girls 10	58	83	81	82	89	57	83	90
11	67	74	71	87	86	77	79	89
12	60	68	70	79	78	61	71	83
13	51	68	84	76	78	51	66	73
Average Per Cent	59	73	76	81	83	61	75	84

[1]The comparisons have been confined to ages 10 to 13 because they are more reliable at these ages.

Figure 30 gives the curves based on the age means of the total character scores (seven tests combined) for the gifted and control groups, separately by sex. These curves possess considerable interest. So far as the writer knows, they are the first curves of character growth ever constructed on the basis of objective tests of proved reliability and validity. They reveal in a very impressive way the great superiority of the gifted over the control and the noticeable superiority of girls over boys in each group. They indicate that the gifted child of 9 years is fully as developed in the character traits measured by these tests as the unselected child of 14 years. An interesting feature of the curves is the fact that

FIGURE 30.

MEAN TOTAL SCORES OF GIFTED AND CONTROL CHILDREN, BY AGE, ON SEVEN CHARACTER TESTS



Note: Small scores are "better," large scores "worse."

the means for boys, both gifted and control, are lower at 13 than at 12, but rise at a steep angle after 13. The curve for gifted girls shows a plateau a year earlier, and that for control girls two years earlier, but the adolescent improvement in character traits comes earlier with girls than with boys.

Summary

1. The total score of ten tests of trustworthiness, devised by Voelker, yielded a reliability coefficient of .75 and correlated to the extent of .60 with a criterion based upon the judgments of teachers and scout leaders. The total score of Cady's five group tests of incorrigibility yielded a reliability coefficient of .75 and correlated .58 with the judgments of teachers. These studies demonstrate that it is possible, by means of objective tests, to make reliable comparisons of groups with respect to certain important character traits.

2. Building upon the results of Voelker, Cady, and others, Raubenheimer devised seven tests of moral instability, each with a reliability of .74 to .80. The total score of this battery yielded bi-serial *r's* as high as .72 and .74 between the parental school groups and groups selected by teachers as superior with respect to moral stability. These tests were shown not to duplicate one another objectionably and not to be primarily measures of intelligence.

3. A battery of seven "character" tests was made up, composed of two of the best tests from Cady's series and five of the best of Raubenheimer's series. This battery was given to 532 children of the main gifted group and to 533 unselected children of a control group. Reliability and validity coefficients for this exact battery have not been computed, but these can be inferred from the data of Cady and Raubenheimer to be above .75 for reliability and above .60 for validity.

4. Comparison of mean scores of the gifted and control groups by age shows a significant superiority of the gifted group for both sexes and at all ages. On the separate tests from 60 to 80 per cent of the gifted equal or exceed the mean of the control group. On the total score of tests 1 to 7, 85 per cent of the gifted equal or exceed the mean of the control group.

5. The gifted child of 9 years has reached a level of character development corresponding roughly to that of unselected children of 14 years.

6. In most of the tests the gifted girl makes a better average score than the gifted boy, while in the control group the sex differences, when any are found, are considerably smaller. In the test of honesty, however, the boys of both groups make a better showing than the girls.

7. Girls begin their adolescent spurt in character development about a year earlier than boys.

8. Sex differences in the variability of scores earned in these tests are for the most part small and inconsistent.

9. Although these tests do not make possible a very reliable comparison of individual children, they warrant the conclusion that in the traits which they measure the gifted group is decisively superior to the control group, and that this superiority is greater for girls than for boys.

CHAPTER XVIII

TRAIT RATINGS[1]

The experiment to be reported in this chapter grew out of the writer's earlier experience with trait ratings in connection with studies of various gifted and subnormal groups of children. The selection of traits to be rated and the method of securing the ratings have both been a matter of gradual development. For several years the following traits were used: general intelligence, capacity for sustained attention, will power, persistence, dependability, studiousness, cheerfulness, obedience, conscientiousness, courage, unselfishness, sense of humor, evenness of temper, intellectual modesty, emotional self-control, physical self-control, initiative, general health, social adaptability, and leadership. The twenty traits are here named in order of teachers' mean ratings of fifty gifted children. The rank order of the traits based upon the means of the ratings given the same children by their parents correlated .76 with this order. In general, the rank order of types of traits, from highest to lowest, for gifted children was intellectual, volitional, moral, emotional, physical, and social. The ratings were made by placing a 1, 2, 3, 4, or 5 before the name of each trait, according as the child was judged to be very superior, superior, average, inferior, or very inferior.[2]

Between 1918 and 1920 ratings were secured by the same method for 121 gifted children on 46 traits. Mean ratings were found for groups of traits as given in Table 189. Means were not computed for the traits separately, because of the large part played by halo effects when an individual is rated on so many different traits.

The mean ratings by teachers is higher than that by parents for four of the five groups of traits; on the other (will and activity), teachers and parents rate about equally high.

[1]Written with the assistance of Florence L. Goodenough.

[2]Lewis M. Terman: *The Intelligence of School Children,* Houghton Mifflin Co., 1918. See p. 181 ff.

TABLE 189.

MEAN RATINGS ON CLASSES OF TRAITS IN PRELIMINARY EXPERIMENT

	Mean Ratings for Groups of Traits	
	Teachers	*Parents*
Emotional	2.04	2.18
6. Sense of humor		
8. Cheerfulness, happiness, freedom from pessimism or worry.		
10. Intellectual modesty (freedom from egotism or vanity).		
13. Emotional self-control (freedom from undue emotionality).		
33. Interest in music.		
46. Religiousness.		
Social	2.08	2.13
11. Talkativeness (when with acquaintances or friends).		
14. Leadership in plays, games, or other social relations.		
15. Popularity among playmates or associates.		
16. Social adaptability, congeniality, or cooperativeness.		
17. Sociability (liking for companionship of other children).		
34. Interest in people.		
36. Sensitiveness to approval or disapproval.		
37. Obedience (including respect for duly constituted authority).		
38. Truthfulness, straightforwardness and honesty.		
39. Sense of justice and fairness; consideration for the rights of others.		
40. Kindness or tenderness toward persons or animals.		
41. Unselfishness and generosity.		
42. Moral courage.		
44. Conscientiousness.		
Will and Activity	1.99	1.98
2. Amount of physical energy.		
7. Self-confidence and self-reliance.		
9. Animation or liveliness of action or speech.		
18. Will power (persistence shown in overcoming difficulties).		
19. Initiative (shown in suggesting things to do, planning new undertakings, etc.).		

Psychophysical	2.27	2.78
1. General health.		
3. Muscular coördination and grace of movement.		
4. Ability in games or sports involving physical activity.		
5. Beauty or handsomeness.		
12. Physical self-control (freedom from nervousness or undue impulsiveness).		
30. Interest in plays and games.		
31. Interest in objective things (as plants, animals, tools, occupations, etc.).		
43. Physical courage.		
Mental Abilities	1.64	1.67
20. Memory.		
21. Imagination (ability to think about things not present to the senses).		
22. Reasoning (ability to see meanings or to follow a complicated train of thought).		
23. Judgment or common sense.		
24. Resourcefulness in overcoming difficulties or attaining ends.		
25. Originality (as shown by inventiveness or by ingenuity in finding explanations).		
26. Curiosity (as shown by inquisitiveness or eagerness to learn).		
27. Mechanical ingenuity (ability to think out mechanical contrivances; may exist without manual dexterity).		
28. General intelligence.		
29. Studiousness.		
32. Interest in books.		
35. Breadth and variety of interests.		

The order of the trait groups, from highest to lowest mean rating for the 121 gifted children, is as follows:

Teachers	Parents
Mental	Mental
Will and activity	Will and activity
Emotional	Social
Social	Emotional
Psychophysical	Psychophysical

The fact that all the means exceed 3, the hypothetical normal, may not be especially significant, since unselected children were not rated in this preliminary study. In the

rating of almost any group of children there is a constant tendency to rate too high. The order of the groups of traits is, however, significant.

When the larger investigation was undertaken, in 1921, considerable thought was given to a revision of the rating method which had previously been used. The number of traits to be rated was reduced to 25, as experience had shown that the use of the larger number made discrimination difficult and increased the halo effects. In making the final selection of traits to be rated the leading experimental and descriptive studies of character and personality were consulted. A tentative list of traits was made out and submitted to several judges, who were asked to rate each trait on two points: (a) with respect to its importance for total character or personality; and (b) with respect to the probable accuracy of the ratings which would be secured by its use. From the tentative list the 25 traits later to be described were finally retained.

The method of securing ratings by the assignment of the numbers 1, 2, 3, 4, or 5 was abandoned in favor of the cross-on-a-line method, which has been found to introduce less halo effect. Effort was made to define the two extremes of each trait in as definite and concrete terms as possible. The instructions and rating forms are reproduced in the following pages. The order in which the traits are given is one which it was thought would reduce halo effects and encourage objectivity of rating. The traits at the beginning of the list are those which the average judge would be most likely to rate with discrimination and frankness. The intellectual traits are near the end.

RATINGS ON PHYSICAL, MENTAL, SOCIAL, AND MORAL TRAITS

Directions: (1) In each trait or characteristic named below, compare this child with the *average child of the same age.* Then make a small cross somewhere on the line for each trait, to show how much of that trait the child possesses. Note that in each case, one end of the line represents one extreme for the trait in question, and the other end of the line the other extreme. The middle of the line represents an average amount of the trait. The meanings of other points are stated in fine print above the line. Before making the cross, read very carefully everything that is printed in small type above the line.

(2) Try to make real distinctions. Do not rate a child high on all traits simply because he is exceptional in some. Children are often very high in some traits and very low in others.

(3) Locate your cross *any place on the line* where you think it belongs. It is *not* necessary to locate it at any of the little vertical marks.

(4) Do not study too long over any one trait. Give for each the best judgment you can, and go on to the next. Please omit none. The ratings will be held absolutely confidential.

(5) Below each line, underline the word that tells how certain you feel about your judgment.

Examples: In *Example 1* the cross shows how one child was rated for beauty, and the line underneath the words "very certain" shows that the one who made the rating felt "very certain" of his judgment. In *Example 2* the cross shows how the same child was rated for obstinacy, and the line under "fairly certain" shows that the one who made the rating felt "fairly certain" of his judgment. Do not rate this child on the "examples."

EXAMPLE 1. BEAUTY.

Extraordinary beauty and charm	Decidedly beautiful	Rather beautiful	Average for age	Rather homely	Decidedly homely	Extremely ugly and repulsive
|	|	|	|	|	X	|

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain?

EXAMPLE 2. OBSTINACY.

Extraordinarily obstinate and stubborn	Decidedly obstinate and stubborn	Rather obstinate	Average for age	Less than average	Decidedly less than average	Extreme lack of obstinacy
|	X	|	|	|	|	|

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain?

☞ BEGIN WITH TRAIT 1, HEALTH

TRAIT 1. HEALTH.

Extraordinarily good health. Almost never sick. Vigorous.	Decidedly superior health	Rather superior health	Average for age	Rather weakly or sickly	Decidedly weakly or sickly	Extremely weakly and sickly. Extreme lack of vigor.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

TRAIT 2. AMOUNT OF PHYSICAL ENERGY.

Extraordinary amount of physical energy, "pep" and animation. Dynamic and tireless.	Decidedly more than average	Rather more than average	Average for age	Rather little energy	Decidedly sluggish and inert	Extreme physical inertia and lack of "pep." Sluggish and easily fatigued.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

TRAIT 3. PRUDENCE AND FORETHOUGHT.

Extraordinary prudence. Always looks ahead. Never sacrifices future good for present pleasure.	Decidedly more prudent than average	Rather more prudent than average	Average for age	Rather happy-go-lucky	Decidedly happy-go-lucky	Extreme lack of prudence. Never looks ahead. Lives wholly in the present.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

TRAIT 4. SELF-CONFIDENCE.

Extreme self-confidence and self-reliance. Always relies on own judgment. Courts responsibilities.	Decidedly self-confident	Rather self-confident	Average for age	Rather self-distrustful	Decidedly self-distrustful	Extreme lack of self-confidence. Distrusts own judgment. Afraid of responsibilities.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

TRAIT 5. WILL POWER AND PERSEVERANCE.

Extraordinary will	Decidedly		Average	Gives up	Decided lack of will and persistence	Extreme lack of will power. Easily discouraged and gives up at slightest difficulty.

TRAIT 6. MUSICAL APPRECIATION.

Extraordinary musical appreciation.	Decidedly strong appreciation	Rather strong appreciation	Average for age	Rather weak appreciation	Decidedly weak appreciation	No musical appreciation whatever.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

TRAIT 7. APPRECIATION OF BEAUTY.

Extraordinary appreciation of beautiful colors, forms, landscapes, sunsets, flowers, etc. Has natural "taste."	Decidedly strong sense of beauty	Rather strong sense of beauty	Average for age	Rather weak sense of beauty	Decidedly weak sense of beauty	Practically no appreciation of beauty in things seen. No "taste."

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

TRAIT 8. SENSE OF HUMOR.

Extraordinarily keen sense of humor. Witty. Appreciates jokes. Sees the funny side of everything.	Decidedly keen humor	Rather keen humor	Average for age	Rather little humor	Decidedly little humor	Extremely lacking in sense of humor. Serious and prosy. Never sees the funny side.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

TRAIT 9. CHEERFULNESS AND OPTIMISM.

Extraordinarily cheerful and optimistic. Never sees dark side. Never worries.	Decidedly optimistic	Rather optimistic	Average for age	Rather pessimistic	Decidedly pessimistic	Usually extremely depressed and pessimistic. Looks on dark side of everything. Worries constantly.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

TRAIT 10. PERMANENCY OF MOODS.

Moods extraordinarily permanent. Almost never goes quickly from joy to sadness, or sadness to joy.	Moods decidedly permanent	Moods rather permanent	Average for age	Moods rather changeable	Moods decidedly changeable	Moods extremely changeable. Always alternating between extreme joy and extreme sadness.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

TRAIT 11. FONDNESS FOR LARGE GROUPS.

Extraordinary fondness for large groups. Unhappy when alone. Devoted to parties, picnics, etc.	Decidedly social	Rather social	Average for age	Rather solitary	Decidedly solitary	Invariably avoids groups. Always prefers to be either alone or with one or two close chums.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

TRAIT 12. LEADERSHIP.

Extraordinary qualities of leadership. Gets others to do his will. Not easily influenced.	Decidedly a leader	Rather tends to be a leader	Average for age	Rather tends to follow	Decidedly a follower	Always a follower. Never takes initiative. Suggestible and easily influenced.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

TRAIT 13. POPULARITY WITH OTHER CHILDREN.

Extraordinarily popular. Universal favorite. Is sought after and has many friends.	Decidedly more popular than average	Rather more popular than average	Average for age	Rather less popular than average	Decidedly less popular than average	Extremely unpopular. Disliked and shunned. A social outcast.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

Trait 14. Sensitiveness to approval or disapproval.

Extraordinary sensitiveness to approval or disapproval of other children. Can't endure to be disliked.	Decidedly more sensitive than average	Rather more than average	Average for age	Rather indifferent to others' opinion	Decidedly indifferent to others' opinion	Utterly indifferent to opinion of other children. Does not care in the least to be liked.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

Trait 15. Desire to excel.

Extraordinary pride in accomplishment and desire to excel. Does his utmost to stand first.	Decidedly anxious to excel	Rather anxious to excel	Average for age	Rather little ambition	Decidedly weak ambition	No pride in accomplishment. No ambition to excel. Almost never does his best.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

Trait 16. Freedom from vanity and egotism.

Extraordinarily free from egotism or vanity. Shrinks from praise or admiration.	Decidedly modest	Rather modest	Average for age	Rather vain	Decidedly vain	Extremely egotistical and vain. "Fishes" for praise. Always showing off.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

Trait 17. Sympathy and tenderness.

Extraordinarily tender and sympathetic. Kind on principle. Abhors cruelty.	Decidedly more than average sympathy	Rather more than average sympathy	Average for age	Rather less than average sympathy	Decidedly less than average sympathy	Extreme lack of tenderness or sympathy. Rarely does a kind act. Tendency to cruelty.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

TRAIT 18. GENEROSITY AND UNSELFISHNESS.

Extraordinarily generous, unselfish, and fair-minded.	Decidedly more generous than average	Rather more generous than average	Average for age	Rather more selfish than average	Decidedly more selfish than average	Extremely selfish. Cares only for own pleasures. Takes unfair advantage.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

TRAIT 19. CONSCIENTIOUSNESS.

Extraordinarily conscientious. Keen sense of duty. Does right for right's sake. Always dependable.	Decidedly more conscientious than average	Rather more conscientious than average	Average for age	Rather less conscientious than average	Decidedly less conscientious than average	Extreme lack of conscientiousness. No sense of duty. Does wrong for any advantage. Not dependable.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

TRAIT 20. TRUTHFULNESS.

Extraordinarily truthful, honest, and frank. Never misleads or misrepresents, however great the temptation.	Decidedly more truthful than average	Rather more truthful than average	Average for age	Rather less truthful than average	Decidedly less truthful than average	Extreme tendency to lying, deceitfulness, and evasiveness. Lies for the slightest advantage.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

TRAIT 21. MECHANICAL INGENUITY.

Extraordinary mechanical ingenuity. Likes and understands machinery, apparatus, etc. Clever at "fixing" things.	Decided mechanical bent	Noticeable mechanical bent	Average for age	Rather less than average	Decidedly less than average	Extreme lack of mechanical ingenuity. Cares nothing for machinery. A blunderer with tools.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

Trait 22. Desire to know.

Extraordinarily strong intellectual curiosity and broad interests. Insistent on knowing.	Decidedly above average curiosity	Above average curiosity	Average for age	Rather weak curiosity	Decidedly weak curiosity	Extreme lack of intellectual curiosity. Mentally inert. Few interests. Rarely asks questions.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

Trait 23. Originality.

Extraordinary ability to think things out for self. Original, resourceful, and inventive. Excels in reasoning.	Decidedly above average	Rather above average	Average for age	Rather below average	Decidedly below average	Extreme lack of originality and resourcefulness. Always depends on teacher or book.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

Trait 24. Common sense.

Possesses common sense and judgment in extraordinary degree. His advice always highly valued.	Decidedly above average	Above average	Average for age	Below average	Decidedly below average	Extreme lack of common sense and judgment. Opinions not taken seriously by anyone.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

Trait 25. General intelligence.

Extraordinary all-round intelligence.	Decidedly above average	Rather above average	Average for age	Rather below average	Decidedly below average	General intelligence extremely inferior. Almost feeble-minded.

Was your judgment on the above trait very certain, fairly certain, rather uncertain, very uncertain? (Underline)

Effort was made to have each child of all the gifted groups rated on the entire list of traits by at least one teacher and by the parents (by either parent alone or by the two working together). This was accomplished in the large majority of cases. Of the 643 children in the main experimental group, almost 600 were rated by teachers and more than 600 by parents. In about 25 cases the ratings were received too late for tabulation. Ratings were also secured from teachers for 523 unselected children of Control Group A (described on pp. 177–178). The age distributions are given in Table 190.

TABLE 190.

AGE DISTRIBUTION OF SUBJECTS GIVEN TRAIT RATINGS

	Rated by Teachers				Rated by Parents	
Age	Gifted Boys	Gifted Girls	Control Boys	Control Girls	Gifted Boys	Gifted Girls
2–4	–	–	–	–	7	5
5	8	8	–	–	11	7
6	16	16	–	–	15	14
7	21	20	–	–	25	19
8	40	38	45	34	41	38
9	55	35	38	43	55	40
10	65	46	38	42	64	47
11	64	44	39	35	57	44
12	31	38	36	35	38	34
13	15	14	38	31	14	15
14	–	–	33	36	–	–
Total	315	259	267	256	327	263
Total by Group	574		523		590	

It was feared that many parents and teachers would hesitate to make the ratings, either because of the difficulty of the task or because of reluctance to record judgments of such confidential nature. The response, however, was far better than had been expected. Very few complained of the difficulty of making the ratings and only in rare cases was a trait omitted. Relatively few judgments were recorded as "rather uncertain" or "very uncertain." We cannot, of course, assume that the raters were always entirely frank, nor that their judgments were uninfluenced by the knowledge that the children of the gifted group had made high scores on an intelligence test. However, the ratings made by parents and teachers agree in so many respects as to indicate either considerable validity for both, or the operation of similar constant errors for both.

Mean Ratings by Age, Sex, and Intelligence

Ratings were scored 1, 2, 3, 4, and so on to 13, 1 being the highest possible rating, 7 "average for age," and 13 the lowest possible. Figure 31, page 532 ff, gives for each trait the line of mean rating by age. The means of gifted children below the age of six years are omitted, because of the small numbers on which they were based. In these figures

x—x—x—x=Parents' ratings of gifted
·····=Teachers' ratings of gifted
————=Teachers' ratings of control

Figure 31 brings out a number of interesting facts. It will be seen that the gifted subjects are rated higher than the control on all the traits except mechanical ingenuity, in which trait the advantage is slightly with the control group. The superiority of the gifted is very great in general intelligence, originality, desire to know, common sense, sense of humor, and desire to excel; rather marked in conscientiousness, truthfulness, self-confidence, will power, and leadership; and in the other traits rather small or irregular. In fondness for large groups, freedom from vanity or egotism, and mechanical ingenuity, the differences are much too small to be significant. The probable errors of the differences shown vary from age to age, but range chiefly between .20 and .40 of a score unit.

Parents' and teachers' ratings show considerable agreement. The parents rate notably higher than the teachers on appreciation of beauty, sense of humor and sympathy; somewhat higher on health, physical energy, fondness for large groups, leadership, popularity, generosity, desire to know, and originality; and lower on prudence and permanence of moods. Parents and teachers rate about equally high on self-confidence, will power, musical appreciation, cheerfulness, sensitiveness to approval or disapproval, desire to excel, vanity, conscientiousness, truthfulness, mechanical ingenuity, common sense, and general intelligence.

Both by parents and teachers the girls are rated a little higher than boys on many of the traits; on musical appreciation and appreciation of beauty, especially, and to a less extent on health, fondness for large groups, popularity, and

FIGURE 31.
MEAN TRAIT RATINGS BY AGE

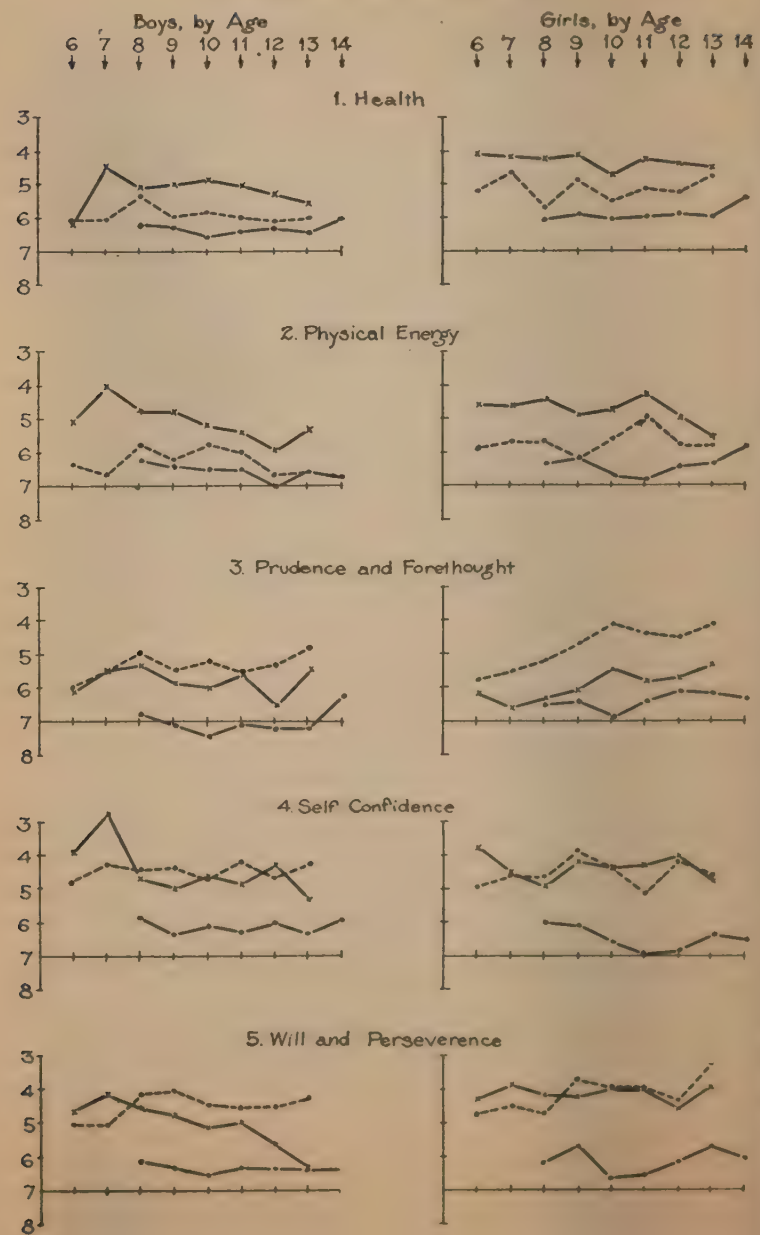


FIGURE 31 (Continued).
MEAN TRAIT RATINGS BY AGE

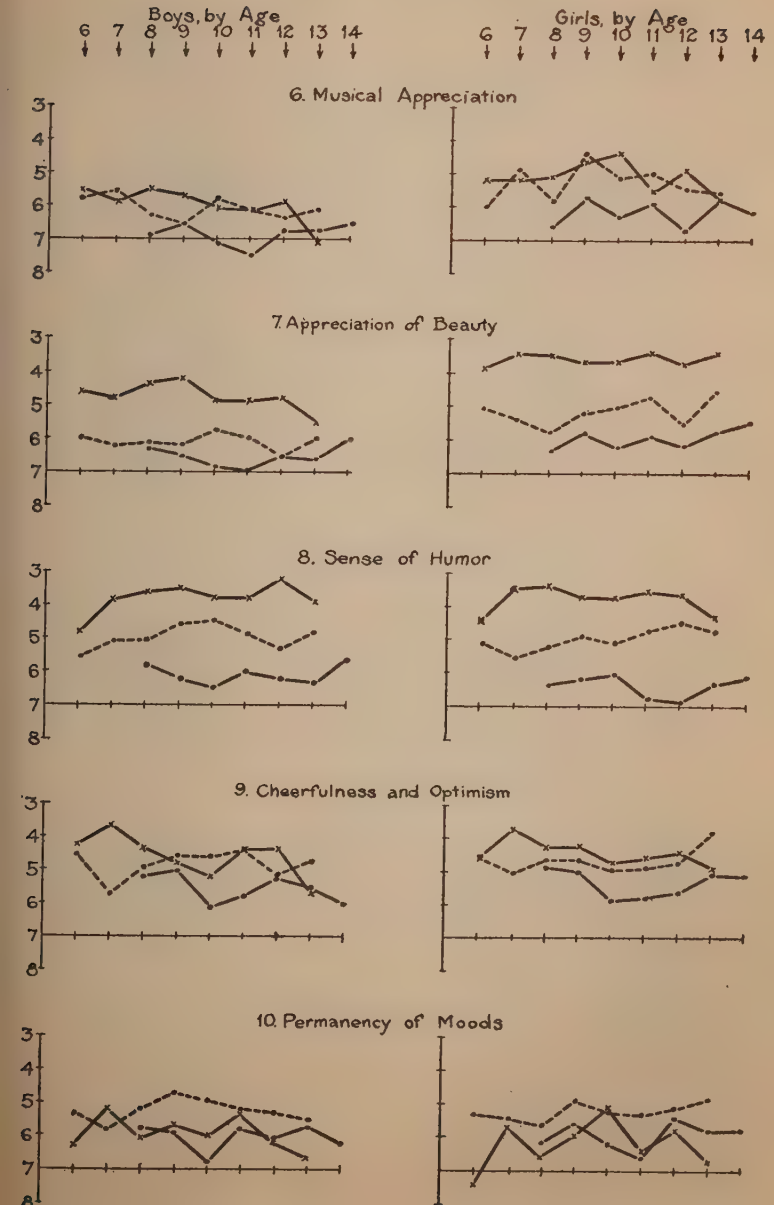


FIGURE 31 (Continued).
MEAN TRAIT RATINGS BY AGE

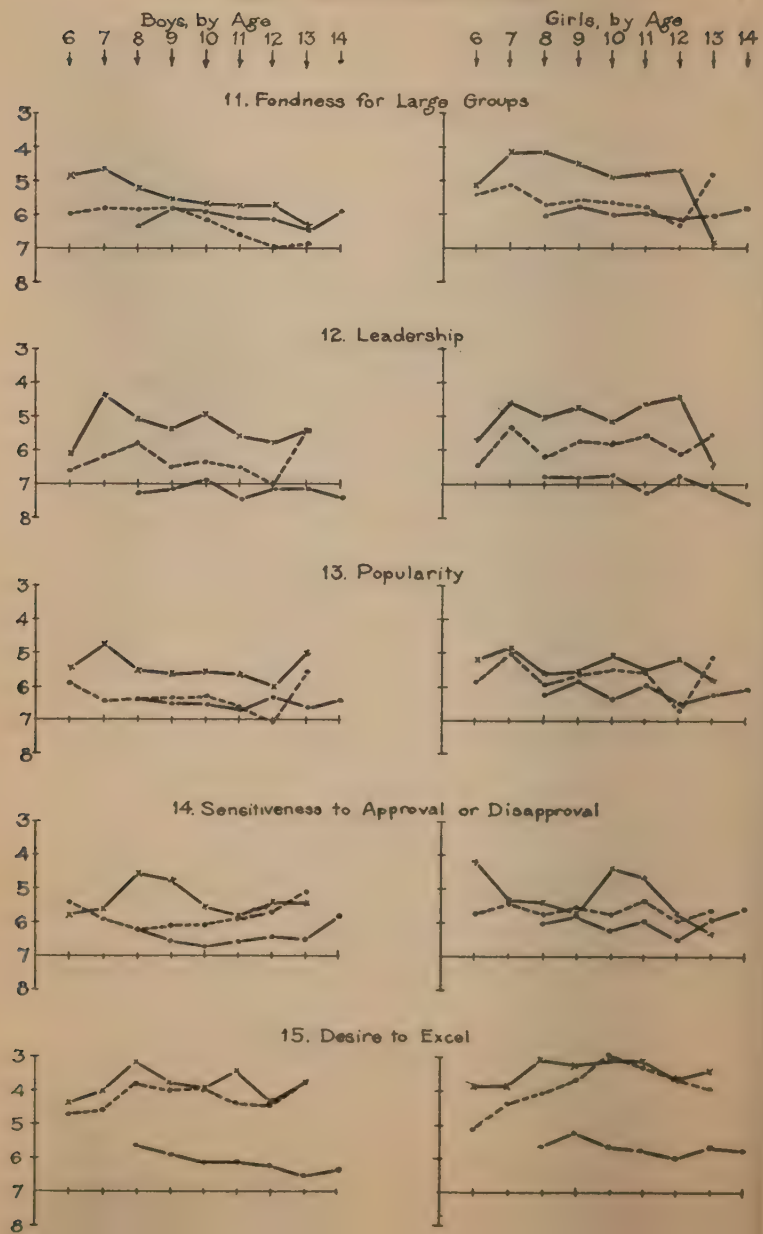


FIGURE 31 (Continued).
MEAN TRAIT RATINGS BY AGE

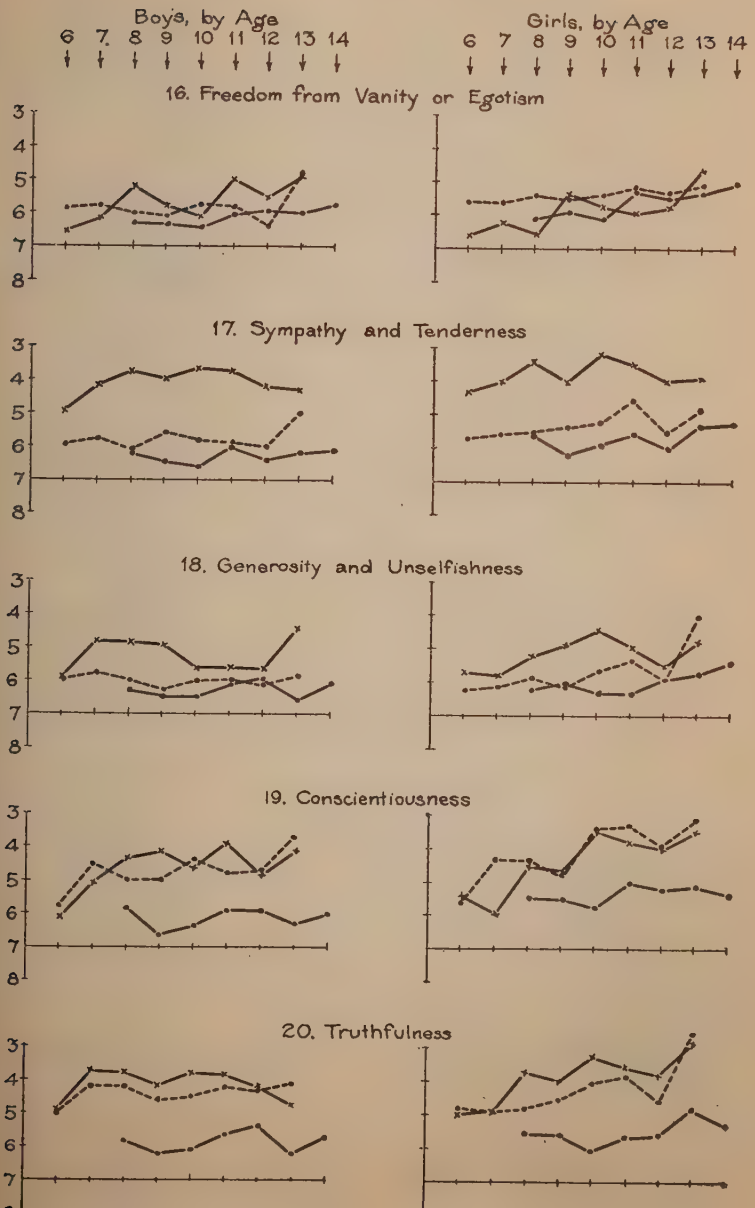
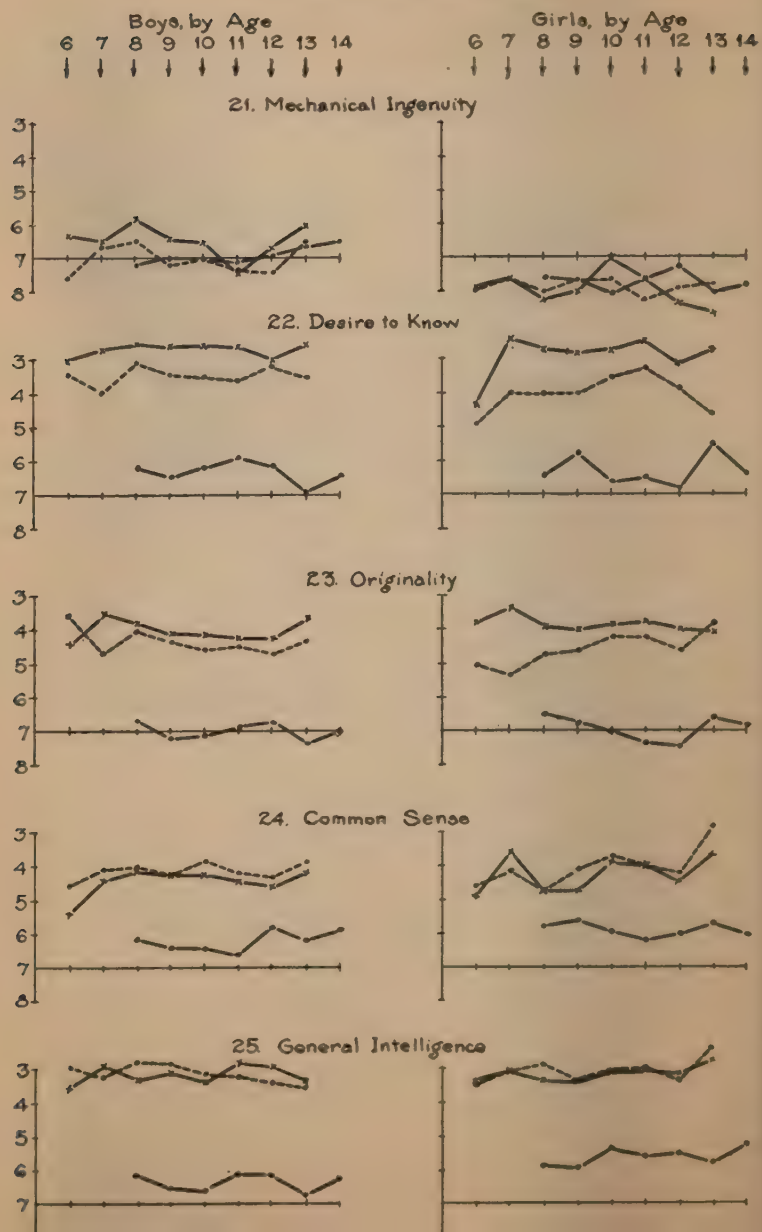


FIGURE 31 (Continued).
MEAN TRAIT RATINGS BY AGE



desire to excel. As would be expected, they are rated lower than boys on mechanical ingenuity.

Not many of the traits show consistent age trends, although the curves for boys more often than those for girls show a downward slope with increasing age. The standard deviations were computed separately for each age group and were found to run remarkably uniform.

Mean Ratings for Ages Combined

Inasmuch as the ratings are so little influenced by age, it is permissible to compare mean ratings for the ages combined. Table 191 gives both the means and the standard deviations for the combined ages.

Table 191.

Means and S. D's of Trait Ratings for Ages Combined

		Teachers' Ratings				Parents' Ratings	
		Gifted Boys	Gifted Girls	Control Boys	Control Girls	Gifted Boys	Gifted Girls
1. Health	M	5.91	5.25	6.33	5.92	5.01	4.32
	S. D.	2.17	2.22	2.08	2.09	2.27	2.29
2. Physical Energy	M	6.14	5.49	6.56	6.35	5.06	4.61
	S. D.	2.18	2.07	2.11	2.19	2.35	2.26
3. Prudence, etc.	M	5.33	4.67	7.03	6.43	5.76	5.87
	S. D.	2.33	2.10	2.14	2.09	2.50	2.53
4. Self-Confidence	M	4.47	4.51	6.16	6.49	4.56	4.29
	S. D.	1.94	2.17	2.04	2.68	2.18	2.12
5. Will and Persistence	M	4.40	4.14	6.40	6.13	4.89	4.12
	S. D.	2.08	1.87	2.18	2.00	2.26	2.05
6. Musical Apprec.	M	6.11	5.17	6.90	6.16	5.90	4.99
	S. D.	2.22	2.03	1.83	1.75	2.39	2.17
7. Apprec. of Beauty	M	6.08	5.17	6.60	5.93	4.70	3.53
	S. D.	1.73	1.86	1.70	1.79	2.22	2.04
8. Sense of Humor	M	4.90	4.92	6.10	6.38	3.69	3.65
	S. D.	2.07	1.99	1.94	2.03	2.07	2.11
9. Cheerfulness, etc.	M	4.75	4.69	5.57	5.31	4.56	4.37
	S. D.	1.97	1.95	1.77	1.82	2.33	2.11
10. Perm. of Moods	M	5.18	5.24	6.04	5.84	5.90	5.91
	S. D.	2.27	2.05	1.82	2.07	2.51	2.59
11. Fondness for Groups	M	6.21	5.64	6.11	5.93	5.50	4.73
	S. D.	2.10	2.24	2.11	2.03	2.60	2.17
12. Leadership	M	6.34	5.78	7.18	6.97	5.27	4.89
	S. D.	1.88	1.95	2.14	2.25	2.18	2.07
13. Popularity	M	6.35	5.68	6.50	6.16	5.48	5.25
	S. D.	2.04	2.00	1.79	1.94	2.05	2.08

		Teachers' Ratings				Parents' Ratings	
		Gifted Boys	Gifted Girls	Control Boys	Control Girls	Gifted Boys	Gifted Girls
14. Sensitiv. to Approv., etc.	M	5.92	5.66	6.41	5.98	5.24	4.86
	S. D.	2.32	2.01	1.88	1.72	2.52	2.33
15. Desire to Excel	M	4.18	3.65	6.08	5.63	3.74	3.28
	S. D.	2.18	1.92	2.42	2.04	1.93	1.89
16. Freedom from Vanity	M	5.92	5.42	6.09	5.61	5.67	5.86
	S. D.	2.67	2.34	1.93	2.03	2.17	2.30
17. Sympathy, etc.	M	5.78	5.25	6.29	5.69	3.89	3.66
	S. D.	2.09	2.10	1.75	1.81	2.32	2.23
18. Generosity, etc.	M	6.04	5.71	6.35	5.97	5.21	5.08
	S. D.	2.06	2.10	1.63	1.64	2.37	2.27
19. Conscientiousness	M	4.77	3.97	6.15	5.36	4.43	4.29
	S. D.	2.49	2.15	2.26	2.20	2.14	2.18
20. Truthfulness	M	4.42	4.26	5.84	5.46	3.97	3.75
	S. D.	2.44	2.26	2.05	2.03	2.27	2.12
21. Mechan. Ingenuity	M	7.06	7.85	6.93	7.69	6.52	7.82
	S. D.	2.19	1.51	1.69	1.49	2.84	3.00
22. Desire to Know	M	3.47	3.86	6.30	6.18	2.67	2.82
	S. D.	1.93	2.07	1.97	2.06	1.86	1.85
23. Originality	M	4.42	4.48	6.82	6.93	4.05	3.87
	S. D.	2.10	2.12	1.88	1.91	2.25	2.10
24. Common Sense	M	4.16	4.14	6.23	5.92	4.37	4.27
	S. D.	1.88	1.88	1.79	1.78	1.95	1.87
25. General Intelligence	M	3.07	3.11	6.35	6.20	3.13	3.10
	S. D.	1.60	1.83	1.90	1.75	1.64	1.65
Traits Combined	M	5.24	4.92	6.37	6.09	4.76	4.50
	S. D.	2.12	2.04	1.95	1.95	2.24	2.17

The number of cases in each group in Table 191 is large (250 to 350) and the probable errors of the differences correspondingly small (usually between .08 and .12 of a score unit). Accordingly, a difference of .30 between two means in Table 191 would ordinarily be two or three times the probable error of the difference.

The Classification of Traits

The rather high reliability of the means makes possible instructive comparisons of the traits when they are classified by groups, as physical, intellectual, social, moral, volitional, emotional, and special ability traits. Such comparisons may be readily made in Figure 32. In this figure the mean ratings for boys are shown on the left, those for girls on the right. For each sex the middle vertical scale shows the teachers' ratings of the control group, the left-hand scale shows teachers' ratings of gifted, and the right-hand scale parents' ratings of gifted.

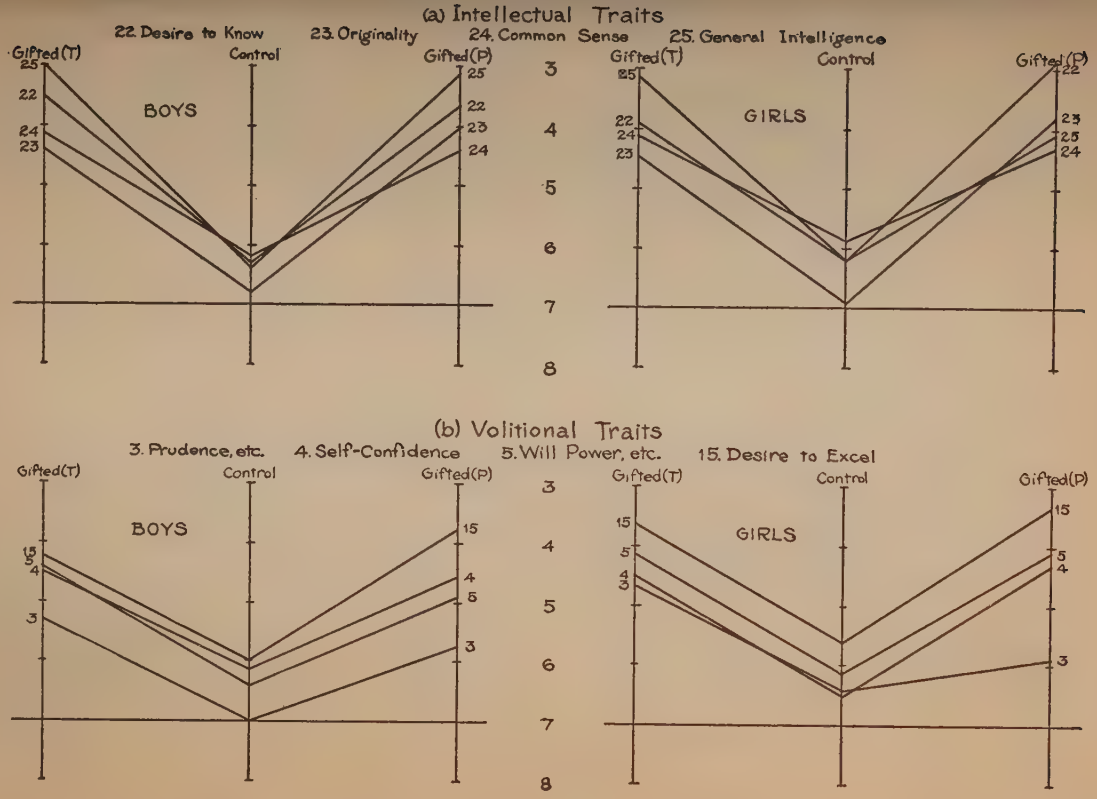
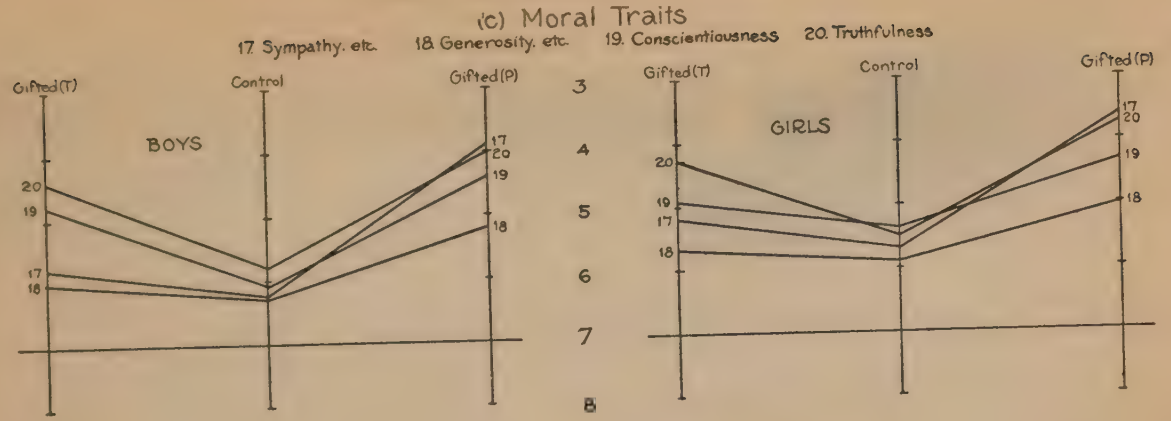
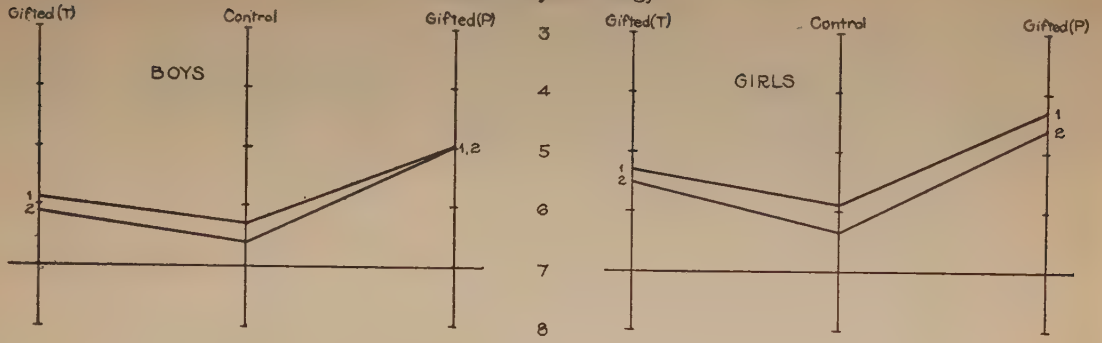

(a) Intellectual Traits
22. Desire to Know
23. Originality
24. Common Sense
25. General Intelligence
Gifted(T)
Control
Gifted(P)
BOYS
GIRLS
(b) Volitional Traits
3. Prudence, etc.
4. Self-Confidence
5. Will Power, etc.
15. Desire to Excel

FIGURE 32 (Continued).
MEAN TRAIT RATINGS, AGES COMBINED



(e) Physical Traits

1. Health 2. Physical Energy



(f) Social Traits

11. Fondness for Groups 12. Leadership 13. Popularity 14. Sensitiv. to Approval, etc. 16. Freedom from Vanity, etc.

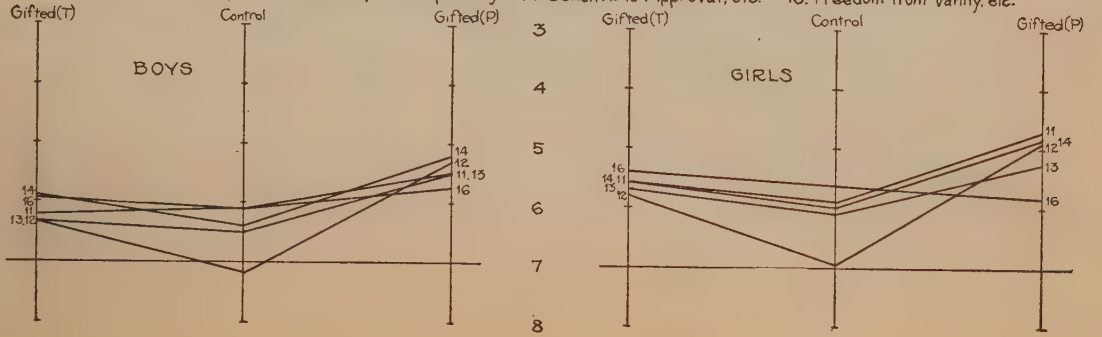


Figure 32 shows that the traits classed together behave, on the whole, rather similarly. Teachers and parents are seen to agree strikingly with respect to the traits in which the gifted excel, and also with respect to the relative degrees of superiority shown by the different classes of traits. The order of superiority, in the judgment of both, is (1) intellectual traits, (2) volitional, (3) emotional, (4) moral, (5) physical, (6) social. In some cases the data have suggested the appropriate classification of a trait. Thus, common sense, which one might be inclined to group with the social traits, behaves more like the intellectual traits, and has therefore been classified with these. For similar reasons self-confidence has been classified with the volitional rather than with the social traits, and sense of humor with the emotional rather than the intellectual. Perhaps sympathy-tenderness and generosity-unselfishness might with equal justification have been classed with either the moral or the social traits. We have placed them with the moral.

The similar behavior of the traits of a given class seems to justify deriving a composite rating for all of the traits of each class, omitting musical appreciation, appreciation of beauty, and mechanical ingenuity. Table 192 gives the means and standard deviations of the combined ratings on the traits of each of these classes.

TABLE 192.

MEAN RATINGS AND STANDARD DEVIATIONS FOR EACH CLASS OF TRAITS

		Teachers' Ratings				Parents' Ratings	
		Gifted Boys	Gifted Girls	Control Boys	Control Girls	Gifted Boys	Gifted Girls
Intellectual	M	3.78	3.90	6.42	6.31	3.55	3.51
	S. D.	1.88	1.98	1.89	1.88	1.92	1.86
Volitional	M	4.60	4.24	6.42	6.17	4.73	4.39
	S. D.	2.11	2.01	2.19	2.21	2.21	2.15
Emotional	M	4.94	4.95	5.90	5.84	4.72	4.64
	S. D.	2.10	1.96	1.84	1.97	2.30	2.27
Moral	M	5.26	4.80	6.16	5.62	4.37	4.20
	S. D.	2.27	2.15	1.92	1.92	2.27	2.20
Physical	M	6.03	5.37	6.45	6.13	5.03	4.47
	S. D.	2.17	2.14	2.09	2.14	2.31	2.28
Social	M	6.15	5.63	6.46	6.13	5.43	5.12
	S. D.	2.20	2.11	1.97	1.99	2.30	2.19

The following per cents of the gifted (teachers' ratings) exceed the mean of the control group of corresponding sex:

	Boys	Girls		Boys	Girls
Intellectual traits	92%	89%	Moral traits	65%	59%
Volitional traits	81%	82%	Physical traits	58%	64%
Emotional traits	68%	68%	Social traits	58%	59%

Figure 33 gives the means for each class of traits by age.

FIGURE 33.
AGE MEANS FOR EACH CLASS OF TRAITS

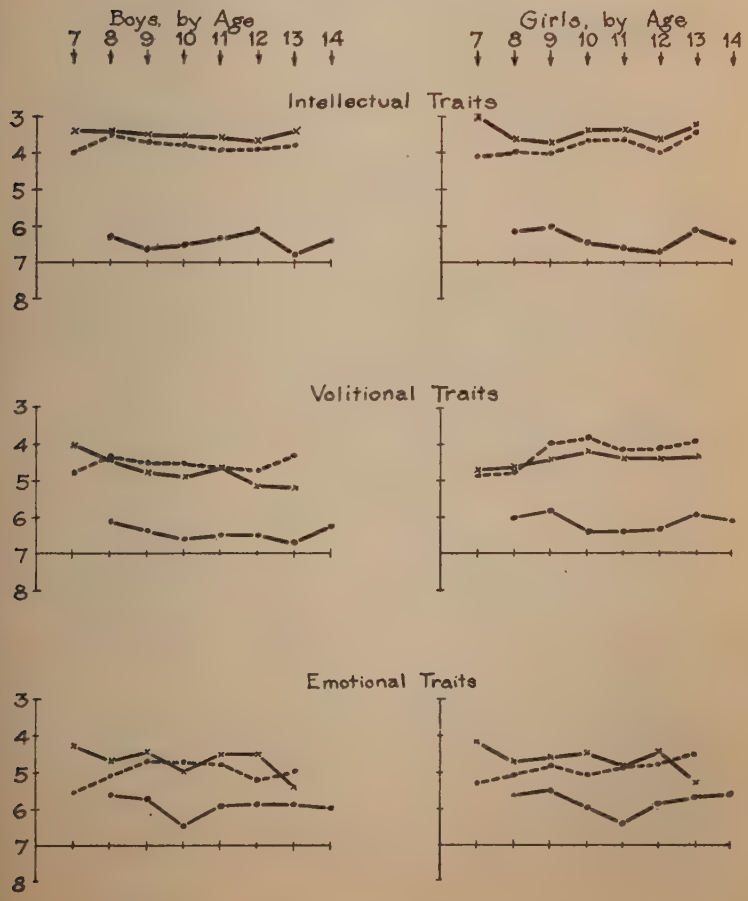


FIGURE 33 (Continued).
AGE MEANS FOR EACH CLASS OF TRAITS

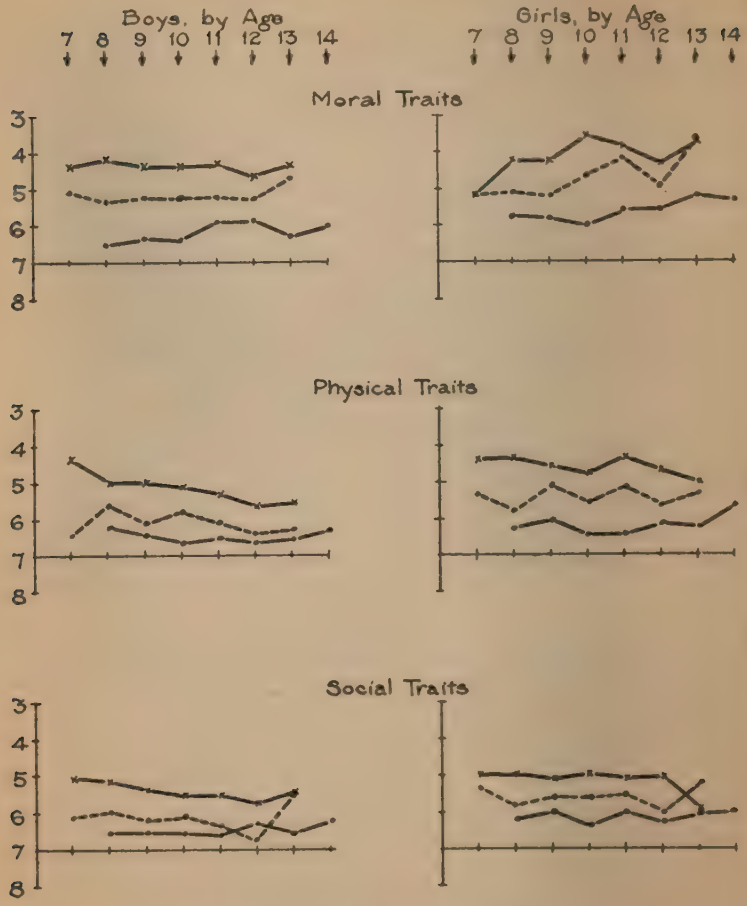


Figure 33 shows that parents rate consistently higher than teachers on the physical, moral, and social traits, and slightly higher on the intellectual traits. On the volitional and emotional traits parents and teachers agree very closely. The mean ratings of girls increase with age in the case of the volitional and moral traits, and do not decrease with age in the case of any of the traits. Ratings of boys on volitional and physical traits tend to decrease slightly with age.

Influence of the Generosity Factor in Trait Ratings

There is little doubt that the unselected subjects of the control group, if they had in all cases been correctly rated, would have yielded a mean of approximately 7, or "average for age" on the rating plan. It is seen in Table 191, however, that the control boys are rated above 7 on every trait except prudence, and control girls above 7 on every trait except mechanical ingenuity. The highest mean for both sexes of the control group is on cheerfulness and optimism; 5.57 for boys and 5.31 for girls. Each of these means is about 1 S.D. higher than it ought to be, and for several other traits the mean is displaced upward by one-half S.D. or more.

We may term this constant influence the "generosity" factor. It may be a special instance of halo effect, due in this case to the natural affection of the teachers for their pupils, and of the parents for their offspring. There is little doubt that we always tend to overrate those we like, the tendency being stronger in the case of some traits than others. When we are rating those we dislike, the generosity factor probably operates negatively.

The relative influence of the generosity factor on the mean ratings for various traits is strikingly shown on the middle vertical line throughout Figure 32. In the case of the intellectual traits the influence is lacking for originality and is only moderately large for the other traits. Turning to the volitional traits, we see that the factor does not enter into the ratings of boys on prudence, but is very large in the ratings of girls on desire to excel. In the case of the other volitional traits its influence is also marked, and about equal for girls and boys. The ratings on moral traits are somewhat more influenced by the generosity factor, especially in the case of girls. The outstanding fact in Figure 32 is the large

influence, with both sexes, on ratings for cheerfulness. In the case of the social traits the generosity factor is somewhat more evident in the ratings of girls than in those of boys, but with both sexes is entirely lacking for the trait leadership. The influence is moderate for the physical traits, but is greater for general health than for physical energy. It does not enter at all into the ratings of boys on the special ability traits, but it affects the ratings of girls considerably, although negatively, in the case of mechanical ability.

It is probably safe to assume that the relative influence of the generosity factor upon the various trait ratings is much the same for the gifted as for the control, although the absolute amount of influence may be greater or less. Probably for most of the traits it is greater, especially in the ratings by parents. Whatever the intelligence of a group, it enters more into the ratings of girls than of boys; a fact which must be taken into account in any comparison of the sexes with respect to trait ratings or school marks.

Overlapping of Gifted and Control on Personality Traits

Although comparison of gifted and control in terms of overlapping can only be justified on the assumption that the generosity factor has operated equally with both groups, an assumption which is not always in accord with the facts, nevertheless, such comparisons are presented in Table 193 for whatever they may be worth.

Table 193.

Per Cent of Gifted (Teachers' Ratings) Who Equal or Exceed the Mean of the Control Group of Corresponding Sex in Trait Ratings

	Per cent of gifted boys at or above control mean	Per cent of gifted girls at or above control mean
1. Health	58%	62%
2. Physical Energy	58%	66%
3. Prudence and Forethought	79%	83%
4. Self-Confidence	81%	82%
5. Will and Perseverance	83%	86%
6. Musical Appreciation	64%	68%
7. Appreciation of Beauty	62%	66%
8. Sense of Humor	72%	77%

	Per cent of gifted boys at or above control mean	Per cent of gifted girls at or above control mean
9. Cheerfulness and Optimism	66%	62%
10. Permanence of Moods	65%	61%
11. Fondness for Large Groups	48%	55%
12. Leadership	67%	73%
13. Popularity	53%	59%
14. Sensitiveness to Approval, etc.	58%	56%
15. Desire to Excel	81%	88%
16. Freedom from Vanity	52%	53%
17. Sympathy and Tenderness	59%	58%
18. Generosity and Unselfishness	55%	55%
19. Conscientiousness	71%	74%
20. Truthfulness	72%	70%
21. Mechanical Ingenuity	48%	46%
22. Desire to Know	93%	87%
23. Originality	87%	88%
24. Common Sense	86%	83%
25. General Intelligence	98%	96%
Traits combined	70%	72%

Rank Orders of the Traits for the Various Groups

Although comparisons of absolute rating scores are to a considerable extent invalidated by the halo and generosity factors, it is still possible to ascertain, from the rank orders of the mean ratings, in what traits the gifted are high or low as compared with their standing on the other traits. The means given in Table 191 yield the following rank orders of the traits for the various groups (Table 194).

Table 194.

Rank Orders of the Traits According to Mean Trait Rating for the Various Groups

	Teachers' Ratings				Parents' Ratings	
	Gifted Boys	Gifted Girls	Control Boys	Control Girls	Gifted Boys	Gifted Girls
1. Health	15	16	13	8.5	14	13
2. Physical Energy	21	19	19	19	15	15
3. Prudence etc.	13	10	24	21	22	23
4. Self-Confidence	8	9	9	22	10.5	11.5
5. Will and Persistence	5	6	16	14	13	9
6. Musical Appreciation	20	14	22	15.5	23.5	19
7. Appreciation of Beauty	19	13	20	10.5	12	4
8. Sense of Humor	11	12	6	20	3	5
9. Cheerfulness etc.	9	11	1	1	10.5	14
10. Permanence of Moods	12	16	3	7	23.5	24

	Teachers' Ratings				Parents' Ratings	
	Gifted Boys	Gifted Girls	Control Boys	Control Girls	Gifted Boys	Gifted Girls
11. Fondness for Groups	22	20	7	10.5	20	16
12. Leadership	23	24	25	24	18	18
13. Popularity	24	22	18	15.5	19	21
14. Sensitiv. to Approv., etc.	16.5	21	17	13	17	17
15. Desire to Excel	4	2	4	5	4	3
16. Freedom from Vanity	16.5	18	5	4	21	22
17. Sympathy etc.	14	16	11	6	5	6
18. Generosity etc.	18	23	14.5	12	16	20
19. Conscientiousness	10	4	8	2	9	11.5
20. Truthfulness	6.5	7	2	3	6	7
21. Mechan. Ingenuity	25	25	23	25	25	25
22. Desire to Know	2	3	12	17	1	1
23. Originality	6.5	8	21	23	7	8
24. Common Sense	3	5	10	8.5	8	10
25. General Intelligence	1	1	14.5	18	2	2

Compared with the control boys, the gifted boys are relatively highest in originality, desire to know, general intelligence, prudence, and will power; they are relatively lowest in fondness for large groups, freedom from vanity, and cheerfulness. The facts are much the same for the gifted girls, although with them self-confidence and sense of humor take a higher rank than with the control, and sympathy and sensitiveness to approval a lower rank.

Rank difference correlations are found as follows:

Teachers' Ratings vs. Parents' Ratings

1. Gifted boys vs. gifted boys — *rho* = .723 ± .08
2. Gifted boys " gifted girls — " = .688 ± .08

Teachers' Ratings

3. Control boys vs. gifted boys — *rho* = .385 ± .13
4. Control girls " gifted girls — " = .118 ± .14
5. Control boys " control girls — " = .696 ± .08
6. Gifted boys " gifted girls — " = .906 ± .02

Parents' Ratings

7. Gifted boys vs. gifted girls — *rho* = .926 ± .02

Correlations 1 and 2 show a considerable agreement between parents and teachers with respect to the traits in which the gifted group most excels the control group. Comparison of correlations 3 and 4 shows that gifted boys resemble control boys more than gifted girls resemble control girls. From correlations 5, 6, and 7 it is seen that sex differ-

ences are more marked in the control group than in the gifted group. This is due chiefly to the fact that gifted girls diverge from control girls in the direction of the masculine.[1]

Unevenness of Ratings for the Individual Children

Ratings of the kind with which we are here dealing are always vitiated to a greater or less extent by the halo effect. The rater's general good or bad opinion of the subject being rated tends to color all his judgments of that person. The effect, of course, is to reduce the variability of the ratings. Conversely, the greater the variability of the twenty-five ratings for a given subject, the more successful the rater has probably been in making real discriminations.

In the case of our 10 year old subjects, both gifted and control, we have computed, for each child, the S.D. of the twenty-five ratings given by the teacher. The mean of the S.D's may be taken as an index of the amount of discrimination the teachers have exercised in their ratings, or the extent to which they have resisted the halo factor. The means and S.D's of these S.D's are as follows:

	Gifted Boys (Teachers)	Gifted Girls (Teachers)	Control Boys (Teachers)	Control Girls (Teachers)	Gifted Boys (Parents)	Gifted Girls (Parents)
Mean	2.04	2.09	1.48	1.62	2.22	2.15
S.D.	.52	.62	.54	.44	.47	.38

On the whole, it appears that the ratings have been made with considerable discrimination.

That the mean variability of individual ratings is greater for the gifted group than for the control group does not necessarily mean that the ratings of the gifted group are less influenced by the halo effect. The gifted child may tend, on the average, to greater unevenness with respect to the twenty-five traits in question. This would necessarily be the case if many of the traits were positively correlated with intelligence, but to different degrees. Since the gifted children are highly selected for intelligence, they would tend to rate considerably above the control group on those traits highly correlated with intelligence, somewhat above the control group on the traits moderately correlated with intelligence,

[1]See similar finding on pp. 367 and 373.

and not at all above on the traits not correlated with intelligence. In other words, the unequal correlation of the various traits with intelligence warrants the expectation that the gifted child will be somewhat more uneven in these traits than the unselected child. The figures given above are in harmony with this expectation.

Certainty of Judgments

It will be recalled that each rater was asked to indicate the certainty of each judgment by underlining one of the phrases "very certain," "fairly certain," "rather uncertain," "very uncertain." The responses were scored 1, 2, 3, or 4, respectively, and were averaged for each trait by age, sex, and intelligence group.

It was expected that the younger children would be rated with much less feeling of confidence than the older. However, the average mean certainty by age for the twenty-five traits showed only insignificant age differences.

Table 195, giving mean certainties for the individual traits, ages combined, makes possible interesting comparisons of the relative difficulty experienced by parents and teachers in rating the various traits in question. The figures in parentheses give the rank orders of the traits with respect to the feeling of certainty with which they are rated.

Table 195 shows that boys and girls are rated with about equal certainty. As would be expected, parents rate the gifted with more certainty than teachers rate them. This holds for every trait. The teachers rate the gifted with more certainty than they rate the control. The latter finding would indicate that the gifted child, on the average, has a more positive and striking personality than the average child, or at least that the teacher feels she knows the gifted child better.

Traits which stand out as especially easy or difficult to rate are the following (with rank orders):

TABLE 195.

MEAN CERTAINTY OF RATINGS

(1 = highest, 4 = lowest)

	Teachers		Teachers		Parents	
	Gifted Boys	Gifted Girls	Control Boys	Control Girls	Gifted Boys	Gifted Girls
1. Health	1.66(17)	1.61(14)	1.77(15)	1.75(16)	1.31(7.5)	1.22(2)
2. Physical Energy	1.56(9.5)	1.54(7.5)	1.66(4)	1.65(8)	1.31(7.5)	1.38(12.5)
3. Prudence and Forethought	1.63(16)	1.67(17)	1.81(18)	1.74(15)	1.43(19)	1.46(21)
4. Self-Confidence	1.45(4.5)	1.54(7.5)	1.67(6.5)	1.71(13)	1.41(18)	1.35(10.5)
5. Will and Perseverance	1.52(8)	1.53(6)	1.71(10.5)	1.62(6)	1.40(16.5)	1.41(17)
6. Musical Appreciation	2.05(24.5)	1.73(19.5)	1.88(20)	1.83(20)	1.47(20)	1.39(15)
7. Appreciation of Beauty	2.05(24.5)	1.81(23)	1.98(23)	1.84(21)	1.36(12)	1.24(3)
8. Sense of Humor	1.62(14.5)	1.57(11)	1.74(14)	1.72(14)	1.23(2)	1.30(7)
9. Cheerfulness and Optimism	1.59(12)	1.56(10)	1.68(8)	1.67(11.5)	1.34(9.5)	1.38(12.5)
10. Permanence of Moods	1.67(18)	1.79(21.5)	1.83(19)	1.82(19)	1.51(23)	1.50(24)
11. Fondness for Groups	1.71(19)	1.65(16)	1.69(9)	1.79(18)	1.37(14)	1.34(8.5)
12. Leadership	1.85(20)	1.73(19.5)	1.78(16.5)	1.67(11.5)	1.58(25)	1.48(22.5)
13. Popularity	1.62(14.5)	1.63(15)	1.66(4)	1.61(5)	1.48(21.5)	1.44(19)
14. Sensitiveness to Approval, etc.	1.61(13)	1.71(18)	1.63(2)	1.65(8)	1.48(21.5)	1.44(19)
15. Desire to Excel	1.37(2)	1.45(3)	1.54(1)	1.51(1)	1.28(6)	1.26(4)
16. Freedom from Vanity, etc.	1.56(9.5)	1.55(9)	1.66(4)	1.56(3)	1.39(15)	1.44(19)
17. Sympathy and Tenderness	1.97(22)	1.82(24)	1.89(21.5)	1.85(22.5)	1.24(3)	1.35(10.5)
18. Generosity and Unselfishness	1.89(21)	1.79(21.5)	2.09(24)	1.85(22.5)	1.40(16.5)	1.48(22.5)
19. Conscientiousness	1.48(6)	1.39(2)	1.73(12.5)	1.53(2)	1.36(12)	1.39(15)
20. Truthfulness	1.49(7)	1.59(12.5)	1.71(10.5)	1.65(8)	1.26(5)	1.29(6)
21. Mechanical Ingenuity	2.03(23)	2.31(25)	2.30(25)	2.45(25)	1.56(24)	1.74(25)
22. Desire to Know	1.40(3)	1.50(4.5)	1.78(16.5)	1.78(17)	1.18(1)	1.18(1)
23. Originality	1.57(11)	1.59(12.5)	1.89(21.5)	1.91(24)	1.36(12)	1.39(15)
24. Common Sense	1.45(4.5)	1.50(4.5)	1.73(12.5)	1.66(10)	1.24(9.5)	1.28(5)
25. General Intelligence	1.32 (1)	1.35(1)	1.67(6.5)	1.59(4)	1.25(4)	1.34(8.5)
Traits combined	1.64	1.63	1.78	1.73	1.37	1.38

Easy to rate	For Teachers Gifted Boys	Gifted Girls	For Teachers Control Boys	Control Girls	For Parents Gifted Boys	Gifted Girls
25. General Intelligence	1	1	6.5	4	4	8.5
22. Desire to Know	3	4.5	(16.5)	17	1	1
15. Desire to Excel	2	3	1	1	6	4
Difficult to rate						
6. Musical Appreciation	24.5	19.5	20	20	20	(15)
7. Appreciation of Beauty	24.5	23	23	21	(12)	(3)
10. Permanence of Moods	18	21.5	19	19	23	24
17. Sympathy, etc.	22	24	21.5	22.5	(3)	(10.5)
18. Generosity, etc.	21	21.5	24	22.5	(16.5)	22.5
21. Mechanical Ingenuity	23	25	25	25	24	25

Exceptions to the rule in the above figures are indicated by parentheses.

In Table 195 the rank order of certainty in the ratings of gifted is higher for parents than for teachers in the case of health, sympathy, appreciation of beauty, and sense of humor. It is lower in the case of prudence, popularity, conscientiousness, and freedom from vanity. Comparing the rank orders of certainty for teachers' ratings of gifted and control, we find that gifted children are relatively (though not absolutely) harder to rate on popularity, sensitiveness to approval or disapproval, conscientiousness, desire to know, originality, and common sense.

Comparison of Table 195 with Table 191 discloses a marked correlation between mean rating score and mean certainty for the individual traits. That is, the higher a child is rated, the greater is the indicated certainty. This holds to a much greater extent for the gifted than for the control. In rating the gifted the tendency is, in case of uncertainty, to rate the child down close to average. The rank order correlations between mean rating and mean certainty (rank orders of traits in tables 191 and 195) are as follows:

Gifted Boys (Teachers)	Gifted Girls (Teachers)	Control Boys (Teachers)	Control Girls (Teachers)	Gifted Boys (Parents)	Gifted Girls (Parents)
.755 ±.06	.717 ±.07	.314 ±.13	.239 ±.13	.831 ±.04	.796 ±.05

These correlations would indicate that judges with more knowledge of the gifted subjects would have rated them even higher than they were rated. It may be, however, that the correlation is due to another cause. It is possible that

when the rater could not conscientiously rate the subject high there was a subconscious tendency to rate the certainty of the judgment low, by way of apology, so to speak.

Relative Variability of the Sexes in Trait Ratings

The relative variability of the sexes in the trait ratings is best indicated by comparison of boys and girls of the control group in those traits which are rated with the greatest certainty of judgment. The ten traits which in the case of the control group are rated with greatest confidence are, in order, desire to excel, freedom from vanity, popularity, sensitiveness to approval or disapproval, general intelligence, physical energy, conscientiousness, will power and perseverance, truthfulness, and cheerfulness or optimism. For these, the Pearson coefficients of variability for ages 8 and 12 of the control group are as shown in Table 196.

Table 196.

Sex Variability in Trait Ratings

	Age 8 (Control)			Age 12 (Control)		
	V of Boys	V of Girls	V Girls / V Boys	V of Boys	V of Girls	V Girls / V Boys
Desire to Excel	.441	.309	.7	.337	.338	1.0
Freedom from Vanity, etc.	.320	.315	1.0	.310	.364	1.2
Popularity	.279	.304	1.1	.327	.225	.7
Sens. to Approval, etc.	.256	.258	1.0	.285	.282	1.0
General Intelligence	.301	.281	.9	.286	.272	.95
Physical Energy	.308	.325	1.1	.330	.376	1.1
Conscientiousness	.407	.352	.9	.319	.421	1.3
Will and Perseverance	.316	.253	.8	.309	.355	1.15
Truthfulness	.350	.338	1.0	.378	.326	.9
Cheerfulness-Optimism	.267	.385	1.4	.354	.306	.9

In the 20 comparisons, the boys are more variable in 8, the girls in 7, and in 5 there is no difference. There is here no consistent evidence of sex difference in variability.

Reliability of the Ratings

We have seen that parents and teachers agree fairly well in regard to the order of the traits based upon the degree of superiority of the gifted over the control (*rho* =.70). It is also important to know how well two equally competent judges would agree in rating the same children on a given trait by the method in question. A comparison of the judg-

ments of two teachers on the same children would give the best answer to the question of reliability, but unfortunately such data are not available. The only comparison of this kind we are able to make, that between the ratings of parents and teachers, is rather unsatisfactory for two reasons: (1) parents and teachers observe the children under very different environment; (2) ordinarily a given parent or teacher rated only one child, and the standards of judgment of various raters doubtless varied greatly. Both of the factors operate to lower the true correlation.

Time has not allowed us to correlate parents' and teachers' ratings of the gifted for each of the twenty-five traits and for all the age groups. Instead, we have taken a single age group (10 year old boys) and correlated the mean rating by parents on each of the following groups of traits with mean rating by teachers on the corresponding group of traits: intellectual, volitional, moral, physical, emotional, and social. This procedure is justified by the data already presented (page 539 ff), showing the similar behavior of the various traits classed in any one of these groups. The computation was not made for the miscellaneous group of special ability traits (musical appreciation, appreciation of beauty, and mechanical ingenuity), as an average rating on such traits would have little meaning. The Pearson correlations are as follows:

	r (parents vs. teachers)
Intellectual traits	.285 ±.08
Volitional "	.278 ±.08
Moral "	.303 ±.08
Physical "	.324 ±.08
Emotional "	.271 ±.08
Social "	.178 ±.085

Summary

1. Data have been reported on the ratings made by teachers and parents of nearly 600 children of the main gifted group, and on the ratings made by teachers of more than 500 unselected children composing a control group. Each child was rated, by the graphic rating scale method, on twenty-five traits, falling roughly into seven groups: intellectual, volitional, emotional, moral, social, physical, and special ability traits. The degree of certainty felt in regard to each judg-

ment was recorded. Means and standard deviations were computed by age, sex, and intelligence.

2. Parents and teachers were found to agree strikingly with respect to the traits in which the gifted excel. The order, according to degree of superiority of the gifted, is (1) intellectual, (2) volitional, (3) emotional, (4) moral, (5) physical, (6) social traits. Mechanical ingenuity is the only trait on which the control group is rated higher than the gifted group.

3. The rank order of the individual traits according to the degree of superiority of gifted over control as shown by teachers' judgments correlates .70 with that based upon parents' judgments. Parents, however, rate the gifted children on the average slightly higher than do teachers, and both parents and teachers rate girls slightly higher than boys on a majority of traits.

4. The Pearson correlation of teacher's mean rating with parent's mean rating for the traits of a single group (intellectual, volitional, moral, social, etc.) is about .30.

5. A constant error due to the generosity factor is evident from the fact that the mean rating of the control group on a majority of the traits is higher than the hypothetical norm designated as "average for age." The displacement of the mean from this cause amounts to half a standard deviation for several of the traits, but varies greatly from trait to trait. It is considerably greater for girls than for boys.

6. That considerable discrimination was exercised by the raters is shown by the standard deviations of the twenty-five ratings for individual children. On the whole, more discrimination was exercised in the ratings of gifted than in those of the control group. The amount of discrimination is an inverse measure of the magnitude of halo effects.

7. The indicated certainty of rating judgments on most of the traits runs fairly high and varies little with age or sex. Parents express greater confidence in their judgments than do teachers, and teachers rate the gifted with more confidence than they rate the control. There is a positive correlation between ratings and certainty of ratings. This is much higher for the gifted than for the control.

8. Consistent sex differences with respect to variability in trait ratings are not found.

CHAPTER XIX

SUMMARY OF DATA ON 309 GIFTED HIGH SCHOOL STUDENTS[1]

The Data

The purpose of this chapter is to summarize some of the more important data which have been secured for a group of 309 gifted subjects located in the high school survey described in Chapter II. These subjects belong to the group designated as Group II. Group II is at the present writing composed of 378 subjects, all of whom were selected on the basis of group test scores (370 on the Terman Group Test, 6 on Army Alpha and 2 on the National).

This group may not be quite as highly selected for intelligence nor as homogeneous as the main experimental group. It is probable that the Terman Group Test is more subject to the influence of schooling, environment, and previous acquaintance with tests than is the Stanford-Binet. Although the procedures to be used in locating and testing the subjects were laid down in considerable detail, the fact that so many high school faculties participated in the survey with but little immediate supervision necessarily affects the value of the results. However, 87 of the 309 subjects were located by the regular field assistants by a uniform procedure. Although the summary here presented is confined to a few of the most important items of information secured, it will be noted that the findings are throughout in general harmony with those for the main experimental group.

Effort was made to secure the following items of information for each subject of the high school group:

1. Terman Group Test score
2. Score on the General Information Test
3. The questionnaire-test on Plays, Games, and Amusements
4. Record of books read during a period of two months

[1]Written with the assistance of Raymond L. Willoughby.

5. Child's report on the Interest Blank
6. Parent's report on the Home Information Blank
7. Teacher's report on the School Information Blank

Item 1 was secured for all, items 3 and 5 for about 90 per cent of the group, and the remaining items for only 76 per cent. In addition, anthropometric measurements and medical examinations were secured for about 100 cases, or a third of all.

All of the above items involved the use of the same blanks as were used in connection with the main experimental group. Perhaps the blanks were as suitable for one group as for the other, but for several reasons the data which they gave are probably less accurate for the high school group than for the main group: (1) The supervision of the child's work on items 2 to 5 was not entirely uniform; (2) the teachers were probably not as well acquainted with their pupils as is the average teacher in the elementary grades; (3) since the high school subjects are older, the memory errors of parents in reporting facts regarding early development are likely to be greater; (4) control data were not available. These serious disadvantages are only in part counterbalanced by the fact that the more fully developed personality of the child of high school age makes possible greater accuracy of report on many items concerning which information was sought from parents and teachers.

The medical examinations, the anthropometric measurements, and the data on plays, games, and amusements have not been summarized for this group. The data on the Home Blank, School Blank, and Interest Blank have been summarized only in part. The reading interests of the group have been dealt with in Chapter XV. The data which have been analyzed agree so closely with the results set forth for the main group that it has not seemed necessary to carry the analysis further than has been done.

Intellectual Composition of the Group

It will be recalled that the method of selection required (1) that each high school teacher nominate the brightest, second brightest, and youngest pupil in each of her classes, and (2) that all the pupils thus nominated be given a Ter-

man Group Test. The minimum T.G.T. scores necessary for inclusion in the group are found on page 37. The standards of admission were based upon an examination of age distributions of T.G.T. scores reported from more than a hundred high schools throughout the country and were intended to yield subjects who would rank within the top one per cent of the general child population, or within the top 2 per cent of the high school population. The scores earned are shown in Table 197.

TABLE 197.

TERMAN GROUP TEST SCORES OF 309 GIFTED HIGH SCHOOL PUPILS

Age Score	12	13	14	15	16	17	18	19	20	21	Total
219–											
215						1					1
210			2	5	3	4	1				15
205		1	4	5	14	5	2	2	1	1	35
200	2	4	7	11	13	25	8	3		1	74
195		2	11	16	21	18	8	4			80
190	2	5	12	2							21
185	1	11	11								23
180	1	8	6								15
175	1	13	4								18
170		5	2								7
165	3	5									8
160	2	2	1								5
155	4	2									6
150											
145	1										1
Total	17	58	60	39	51	53	19	9	1	2	309

Since the high school survey was completed, 48 of the subjects, chiefly of this group, have taken the Thorndike Intelligence Examination for entrance to Stanford University. Their Thorndike scores ranged from 68 to 113 with an average of 89. The average score of entering students at Stanford over a period of two years was 71, and only about 8 per cent score as high as the average of those who have entered from the gifted group. The average score of fourteen Stanford professors on the same test was 95.

SEX PROPORTIONS

The 309 subjects were distributed by age and sex as follows:

	Number at each age								
	12	13	14	15	16	17	18	19 or above	Total
Boys	9	31	38	28	28	41	13	12	200
Girls	8	26	23	11	23	12	6	0	109
Total	17	57	61	39	51	53	19	12	309

Note. Age 12 means 12 to 13; 13 means 13 to 14, etc.

The proportion is 64.7 per cent boys to 35.3 per cent girls, or in the ratio of 183 boys to 100 girls.[1] This is to be compared with the ratio of 116 boys to 100 girls in the main experimental group. (See Chapter III.) In both groups the preponderance of boys is marked, but it is far greater in the high school group and is found at every age. The excess of boys in the high school group, as compared with the main experimental (pre-high school) group, might be explained as due to one or more of the following factors:

(1) Nominations in the grades below the high school were practically all made by women teachers, while roughly a third of the nominations in the high school were made by men teachers. It might be supposed that the latter would be more inclined to favor boys in their nominations. Unfortunately, the nomination blanks used in the high schools were not always returned to us with the other data, and it was impossible to determine whether a sex preference had entered into the nominations.

(2) The Terman Group Test may do injustice to the intelligence of girls. This hypothesis is contradicted by the fact that mean T.G.T. scores of unselected girls of ages 12, 13, and 14 have been found to be about as high as those for unselected boys.

(3) It may be that the excess of boys in all gifted groups is due to greater male variability. Considerable evidence could be assembled from test results in support of this hypothesis, but the findings are far from consistent.

(4) It may be that the mental development of boys continues after that of girls has ceased, which, if true, could give a marked excess of gifted boys in the upper ages. This may account for the difference between high school group and main experimental group in sex ratio, although the increase by age in the ratio of boys to girls is not as regular and consistent as this hypothesis would lead one to expect.

[1]For the entire 378 pupils composing Group III the ratio was 212 to 100. (See p. 49.)

Whatever the cause, it seems that in the years of middle and later adolescence there is a large excess of high scoring boys. In the case of Stanford students given the Thorndike Intelligence Examination, the 99th percentile for 754 consecutive male entrants was 105.7 and for 150 consecutive female entrants 99.7, notwithstanding the fact that women students at Stanford, owing to the limitation of 500 in their number, are far more highly selected than the men. Only one woman tested as high as 110, while six men made scores ranging from 110 to 124. Book's survey of 5,748 seniors in the high schools of Indiana, based upon a test somewhat similar to the Army Alpha, also gave a significant excess of high scoring boys, especially in the upper ages.[1] Dr. Yates, using the Army Alpha and the Terman Group Test, located the 25 "brightest" seniors in five Oakland high schools. Her group yielded 15 boys and 10 girls, a ratio of 150 to 100.[2]

Geographical Location of Pupils

Requests for coöperation were sent to all the high schools in the state, numbering at that time (autumn, 1921) approximately 364. The principals of 103 agreed to coöperate and were supplied with the requisite blanks and instructions. A report was made to us by 95 schools, having a total enrollment of approximately 70,000 pupils. The schools may be grouped by counties as follows:

Division	*Counties*
The North	Del Norte, Siskiyou, Humboldt, Trinity, Shasta, Mendocino, Tehama, Glenn, Butte, Lake, Colusa.
The Mountains	Modoc, Lassen, Plumas, Sierra, Nevada, Placer, El Dorado, Amador, Alpine, Calaveras, Tuolumne, Mono, Mariposa.
The Bay	Sonoma, Napa, Solano, Marin, Contra Costa, San Francisco, Alameda, San Mateo, Santa Clara.
The Valley	Yuba, Sutter, Yolo, Sacramento, San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare, Kern.
The Coast	Santa Cruz, San Benito, Monterey, San Luis Obispo, Santa Barbara, Ventura.

[1]W. T. Book: *The Intelligence of High School Seniors.* Macmillan, 1922.
[2]Dr. Dorothy Yates: *A Study of Some High School Seniors of Superior Intelligence. J. of Educational Monographs,* 1922. Public School Publishing Company, Bloomington, Illinois.

Division	*Counties*
Los Angeles	Los Angeles, Orange.
Southeast	Inyo, San Bernardino, Riverside, San Diego, Imperial.

The following counties, having a total enrollment of 6,465 high school pupils, were not surveyed:

Calaveras	147	Mariposa	64	San Luis Obispo	1,047
Del Norte	88	Modoc	246	San Mateo	2,285
El Dorado	216	Plumas	86	Sierra	53
Lassen	295	San Benito	468	Solano	1,419
		Trinity	51		

Table 198 shows the comparative percentages of pupils qualifying in the various geographical divisions, and Table 199 the per cent qualifying in high schools of various sizes. The figures of both these tables are affected by so many unknown factors that they are rather misleading. In the first place, it cannot be assumed that the research was equally thorough in all the schools. The procedure may not always have been exactly uniform, and even apart from this it is probable that pupils in the smaller schools stood a better chance of being discovered from the mere fact that their teachers knew them better. In some of the schools all the pupils were tested; in others, only those nominated according to instructions. Possibly in the case of a few high schools not all the four grades were covered. Finally, there are probably some inconsistencies in the reports of enrollment, according to whether part-time students were or were not included. Possibly in a few cases seventh and eighth grade pupils in junior high schools were erroneously included in the enrollment reports. Nevertheless, the figures are given for whatever thay may be worth.

TABLE 198.

PERCENTAGES OF GIFTED HIGH SCHOOL SUBJECTS BY GEOGRAPHICAL LOCATION

Division	Enrollment in Schools Covered	Qualified	Per Cent
North	2,495	12	48%
Mountains	918	3	33%
Bay Cities	8,628	75	87%
Valley	19,930	46	23%
Coast	3,738	15	40%
Los Angeles	29,906	150	50%
Southeast	4,647	7	15%
Total	70,264 (approx.)	308	44%

TABLE 199.

PERCENTAGES OF QUALIFYING SUBJECTS IN HIGH SCHOOLS OF VARIOUS SIZES

Enrollment	Schools	Enrollment in Schools Covered	Qualified	Per cent Qualified
0– 100	18	1,168	11	94 %
101– 250	27	4,704	30	64 %
251– 500	20	7,136	38	53 %
501–1000	14	10,819	13	12 %
1001–2000	9	13,015	90	69 %
2001–	7	29,652	107	36 %
Total	95	66,494	289	43.5%

The totals of Table 199 do not agree with those of Table 198. This is due to the omission from Table 199 of certain schools for which the percentages were known not to be representative, owing to incompleteness of the survey or to other disturbing factors.

It will be noted that somewhat less than one-half of one per cent of the pupils enrolled in these high schools qualified. According to this figure the total enrollment of 220,000 in California high schools in 1921–22 might have yielded about 1,000 cases of the desired degree of superiority. However, we cannot safely assume that the proportion of gifted would have been the same in the schools not covered, and there is no way to estimate the number who were missed in the schools that were covered. Perhaps a liberal estimate would be that not more than one pupil in a hundred in the high schools of California could have qualified. However, since high school students are as a group rather highly selected, it is probable that most of these 309 subjects belong to the top one-half of one per cent of the total child population of their respective ages in California. This would make the group only a little less highly selected than the main experimental group.

ANCESTRY

Information was given in the Home Blank regarding the ancestry of 241 of the 309 subjects. The data were treated as were the corresponding data for the main group, one unit of weight being assigned to each of the great-grandparents. The results are shown in Table 200. "American" in this table means descended from old American stock, usually colonial,

not clearly specified. Probably in a large majority of cases it means English. The per cents are sums of the "blood per cent" of each nationality.

TABLE 200.

NATIONALITY ORIGIN OF GIFTED CHILDREN IN THE HIGH SCHOOL GROUP

English	30.8%	Swiss	0.94%
Scotch	12.7%	Norwegian	0.9%
German	11.8%	Italian	0.45%
Irish	10.3%	Syrian	0.4%
American	7.3%	Polish	0.4%
Dutch	6.4%	Chinese	0.2%
Jewish	6.2%	Finnish	0.2%
French	4.2%	Spanish	0.13%
Welsh	2.3%	Canadian	0.1%
Swedish	1.1%	Danish	0.02%
		Not specified	3.16%

Table 201 shows the per cent of subjects in the group who are represented in the various nationalities by at least one parent, one grandparent, or one great-grandparent.

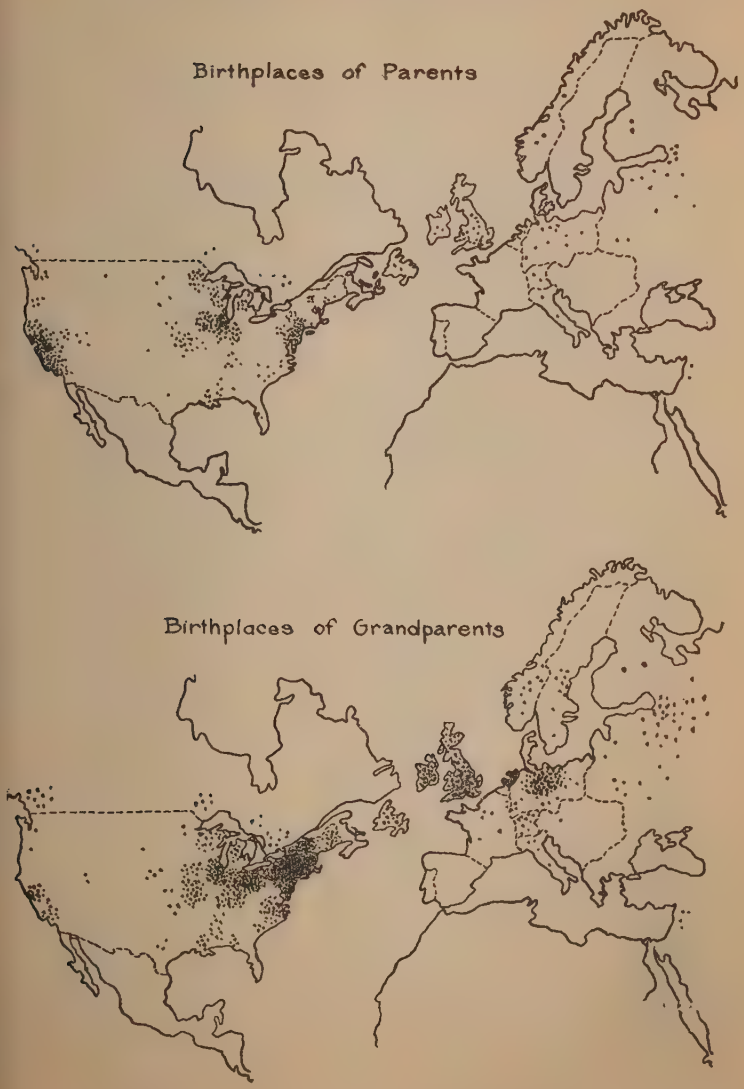
TABLE 201.

NUMBER AND PER CENT OF CHILDREN REPRESENTING VARIOUS NATIONALITIES

Nationality	No. of children	Per cent
American	47	19.5%
English	169	70%
Dutch	61	25%
Irish	105	44%
German	78	32%
Welsh	24	10%
French	54	22%
Scotch	120	50%
Swiss	8	3.3%
Italian	2	0.8%
Jewish	17	7.0%
Swedish	7	2.9%
Norwegian	4	1.6%
Danish	1	0.4%
Spanish	2	0.8%
Syrian	1	0.4%
Finnish	1	0.4%
Chinese	1	0.4%
Polish	1	0.4%
Canadian	1	0.4%

The above figures, like those for the main group, cannot be accurately interpreted in the absence of comparative

FIGURE 34.
BIRTHPLACES OF PARENTS AND GRANDPARENTS OF HIGH SCHOOL GIFTED GROUP



figures for the general population. However, certain facts stand out as clearly significant; for example, in Table 200, the high percentage of English, Scotch, German, Irish, Dutch, and Jewish blood, and the low percentage of Spanish and Italian. The Spanish percentage (0.13 per cent) is especially low in comparison with the amount of Spanish blood in the general population. No negro blood is represented.

The birthplaces of 242 subjects was stated. Of this number, exactly half were born outside of California, of whom seven were born outside of the United States. Table 202 gives the birthplaces of 482 parents and 609 grandparents. This table and the accompanying map (Figure 34) are extremely interesting. These children are drawn in the main from seven national stocks, coming originally from northwest Europe, and from the Jewish racial stock who have immigrated from Russia and Germany. The movement of the representatives of these stocks to California has been very rapid and they have come (1) direct from Europe, (2) direct from the northeast United States, or (3) from the northeast United States with one or more stops in the central valley. The Latin stocks and races other than the Caucasian are for all practical purposes unrepresented; while this in no sense proves their inferiority, it renders such an hypothesis reasonable.

TABLE 202.

BIRTHPLACES OF PARENTS AND GRANDPARENTS OF HIGH SCHOOL GIFTED GROUP

	Parents		Grandparents	
United States	No.	Per cent	No.	Per cent
Alabama	1	0.2%	5	0.5%
Arkansas	2	0.4%	3	0.3%
California	93	19.3%	22	2.4%
Colorado	1	0.2%	—	—
Connecticut	3	0.6%	10	1.1%
District of Columbia	3	0.6%	—	—
Florida	1	0.2%	—	—
Georgia	2	0.4%	5	0.5%
Illinois	40	8.3%	41	4.4%
Indiana	15	3.1%	33	3.6%
Iowa	23	4.8%	14	1.5%
Kansas	19	4.0%	2	0.2%

	Parents		Grandparents	
United States	No.	Per cent	No.	Per cent
Kentucky	2	0.4%	12	1.3%
Louisiana	4	0.8%	8	0.9%
Maine	—	0.0%	14	1.5%
Maryland	4	0.8%	14	1.5%
Massachusetts	8	1.7%	30	3.2%
Michigan	11	2.3%	15	1.6%
Minnesota	15	3.1%	2	0.2%
Missouri	23	4.8%	27	2.9%
Mississippi	5	1.0%	11	1.2%
Montana	1	0.2%	—	—
Nebraska	3	0.6%	4	0.4%
Nevada	5	1.0%	—	—
New Hampshire	6	1.2%	9	1.0%
New Jersey	4	0.8%	3	0.3%
New York	29	6.0%	104	11.2%
North Carolina	1	0.2%	4	0.4%
North Dakota	2	0.4%	—	—
Ohio	23	4.8%	82	8.9%
Oregon	5	1.0%	1	0.1%
Pennsylvania	16	3.3%	49	5.3%
Rhode Island	1	0.2%	2	0.2%
South Carolina	2	0.4%	3	0.3%
South Dakota	2	0.4%	—	—
Tennessee	5	1.0%	16	1.7%
Texas	1	0.2%	3	0.3%
Utah	4	0.8%	2	0.2%
Vermont	1	0.2%	21	2.3%
Virginia	2	0.4%	19	2.1%
Washington	3	0.6%	1	0.1%
West Virginia	1	0.2%	4	0.4%
Wisconsin	17	3.5%	13	1.4%
Wyoming	—	—	1	0.1%
Foreign Countries				
Alsace	1	0.2%	4	0.4%
Australia	—	—	2	0.2%
Austria	—	—	1	0.1%
Canada	11	2.3%	34	3.7%
China	4	0.8%	2	0.2%
England	12	2.5%	52	5.6%
Finland	2	0.4%	2	0.2%
France	—	—	5	0.5%
Germany	9	1.9%	74	8.0%
Holland	2	0.4%	14	1.5%
Italy	2	0.4%	4	0.4%
Ireland	3	0.6%	31	3.3%
Luxembourg	—	0.0%	1	0.1%

Foreign Countries	Parents		Grandparents	
	No.	Per cent	No.	Per cent
New Zealand	1	0.2%	—	—
Norway	3	0.6%	9	1.0%
Russia	16	3.3%	40	4.3%
Scotland	—	—	15	1.6%
Sweden	—	—	10	1.1%
Switzerland	2	0.4%	9	1.0%
Syria	2	0.4%	4	0.4%
Wales	2	0.4%	4	0.4%
West Indies	—	—	1	0.1%
Total	481		927	

Of parents, 409, or 86.7 per cent, were born in the United States, and of these, 388 (80.2 per cent of all) were born outside of California. There were 22 cases in which both parents were foreign born, and 28 in which one was foreign born.

Of grandparents, 63 per cent were born in the United States and 94 per cent of the entire number outside of California. Of the grandparent couples, both members were foreign born in 27.3 per cent of cases, and one member in 11.4 per cent of cases.

Occupational Background

For 235 children information was obtained regarding the various occupations which the father, mother, uncles, aunts, and grandparents had followed. This information is summarized in Table 203. As would be expected, the data are less complete for uncles, aunts, and grandparents than for parents. The most common occupation of maternal relative, that of housewife, is not included in Table 203. Attention is called to the fact that the figures include for a given relative all the main occupations which that relative has followed. If account had been taken only of the last occupation followed, the showing would ordinarily have been even better than it was. The per cents of Table 203 are, therefore, not per cents of individuals, but per cents of all occupations which have been followed.

TABLE 203.

OCCUPATIONS FOLLOWED BY RELATIVES OF HIGH SCHOOL GROUP

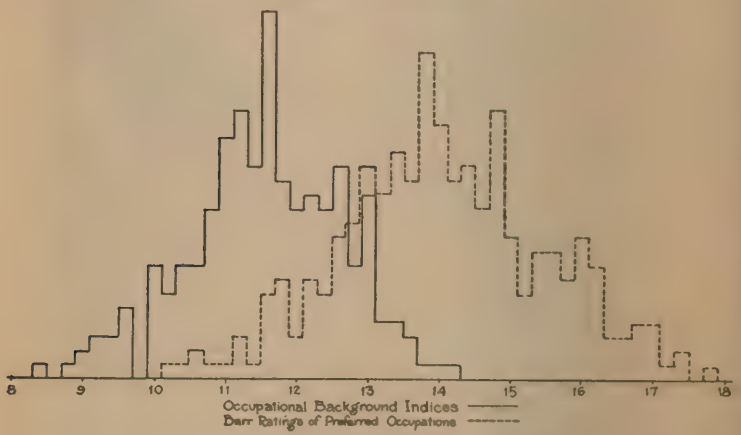
Paternal Relatives	Father	Father's Father	Father's Mother	Father's Sibs
Total number of occupations mentioned	455	301	42	509
Professional	31.2%	22.6%	81.0%	32.8%
Business	35.4%	20.9%	2.4%	33.8%
Agriculture	14.7%	33.5%	0.0%	17.3%
Skilled labor	16.3%	18.9%	11.9%	11.8%
Unskilled or semi-skilled	2.4%	4.0%	4.8%	4.3%
Maternal Relatives	**Mother**	**Mother's Father**	**Mother's Mother**	**Mother's Sibs**
Occupations mentioned	155	312	61	499
Professional	61.9%	24.0%	77.1%	34.8%
Business	24.5%	32.1%	14.7%	26.5%
Agriculture	1.3%	25.6%	0.0%	16.3%
Skilled labor	10.3%	14.4%	8.2%	16.5%
Unskilled or semi-skilled	1.9%	3.9%	0.0%	6.0%

A quantitative index of the occupational background has been obtained by rating on the Barr Scale of Occupational Intelligence each occupation named. Mr. Willoughby attempted a refinement of this index by a system of weights which gave greater value to the occupation of a parent than of a grandparent or parent's sib, and greater value to the present than to an earlier occupation of the father. However, when such a system of weights was applied to a sampling of families the resulting occupational index differed by only about 7 per cent from that based upon an unweighted average. Accordingly, the index of occupational background used was simply the average Barr rating of all the occupations which parents, grandparents, uncles, and aunts had followed. This mean index found was 11.8, as compared with an average of 8.8 for the general population of San Francisco, Oakland, and Los Angeles. (For the derivation of occupational index for the general population, see Chapter IV.) The average of 11.8 is slightly lower than that found for the fathers of the children of the main group (12.77). This would be expected in view of the fact that for the high school group the index is based upon all the occupations which have been followed by near relatives, not upon the present

occupation of the father. Occupations which rate approximately the same as the average of all occupations for relatives of the high school group are: stenographer (11.7), librarian in a small library (12.0), and graduate nurse (12.0).

Figure 35 gives the distribution of the occupational background indices for the 235 children, the index for each child being the average rating of all near relatives. *It will be noted that only a single child has an occupational background in-*

FIGURE 35.
OCCUPATIONAL BACKGROUND INDICES AND BARR RATINGS OF PREFERRED OCCUPATIONS



dex below the average Barr rating of 8.8 found in Chapter IV for the general male adult population. One may conclude that if the father of a gifted child follows a lowly occupation, the probability is that the average occupational rating of his other near relatives will be higher; that is, in such a case the family stock is probably somewhat better than the humble occupation of the father would suggest.

HEALTH AND PHYSICAL DATA

Although medical examinations and anthropometric measurements were given to approximately 100 of the high school subjects, the only data here summarized are those furnished by the Home Blank and School Blank.

Health and energy ratings. Parents and teachers rated the subjects on the twenty-five traits named in Chapter XVIII, and by the same method. The ratings on general health and on physical energy are summarized in Table 204. In this case the ratings were scored from 1 to 7, 1 being the highest rating, 7 lowest, and 4 average. The certainty of ratings was scored from 1 to 4, 1 meaning "very certain," 2 "fairly certain," 3 "rather uncertain," and 4 "very uncertain."

TABLE 204.

HEALTH AND ENERGY RATINGS OF HIGH SCHOOL GROUP

	Mean Ratings by Parents			Mean Ratings by Teachers		
	Boys N=153	Girls N=89	Total N=242	Boys N=166	Girls N=95	Total N=261
General Health	3.1	2.8	2.95	3.35	3.1	3.25
Physical Energy	3.2	3.1	3.15	3.4	3.2	3.3
Certainty of Judgment	—	—	1.4	—	—	1.75

That is, both parents and teachers, with a rather high degree of certainty regarding the correctness of their judgments, rate these subjects considerably above "average" in health and physical energy. The mean rating for the girls is appreciably higher than that for the boys on both traits. In health only 4 per cent were rated by the parents more than half a step below "average," and only 5½ per cent by the teachers. In energy the parents rate 2 per cent this low, the teachers 7 per cent.

Age of parents at birth of child. The mean age of father at birth of child was 32.4; of mother, 29.1. The distribution of ages is as follows:

	Below 20	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	Mean
Father (N=235)	0	21	49	71	45	35	8	5	1	32.4
Mother (N=236)	5	43	76	66	40	6	0	0	0	29.1

Duration of pregnancy. This was normal in 90 per cent of cases. Fourteen, or 6 per cent, of the births were reported as premature by one-half month or more; eight, or 3.4 per cent, were reported as overtime.

Mother's health during pregnancy. Statements made on

this point were converted into ratings on a five-point scale, 1 signifying "excellent," 3 "average," and 5 "very poor." The distribution of the ratings was as follows:

Rating	1	2	3	4	5	Mean
Frequency	59	107	42	23	6	2.2

Conditions of birth. Birth was described as difficult ("severe," "prolonged," "instrumental delivery," etc.) for 55 per cent of boys and 33 per cent of girls; as easy for 9 per cent of boys and 12 per cent of girls. The more important cases of difficult birth were as follows:

	Cases
Prolonged (72 hours' duration or over)	2
Dry birth	2
Breech presentation	2
Face presentation	1
Surgery necessary	2
Umbilical cord around neck	1
Convulsions	1
Attached placenta	1
Premature birth induced by shock	1
Twins	1 (pair)

Birthweight. Birthweights reported ranged from 3 to 15 pounds, with average of 8 lbs., 6.4 oz. for boys and 8 lbs., 3.2 oz. for girls. These figures, like those for the main group, are considerably above the average, especially the mean for girls.

Infant feeding. Approximately 91 per cent of the children were at least partially breast fed and about 65 per cent were exclusively breast fed for a period of ten months or longer. These figures are even higher than those for the main group.

Health during first year. Statements on this point have been converted into ratings on a five-point scale, with the following results:

	Excellent	Good	Fair	Poor	Very Poor	
Rating	1	2	3	4	5	Mean
Boys (N=146)	46	61	22	13	4	2.1
Girls (N=86)	38	37	6	3	2	1.8

Dentition, walking, and talking. The mean age of appearance of first tooth was 7.3 months for boys and 7.2 months for girls. The range was from 5 to 14 months.

Table 205 gives the distribution of ages for walking alone ("several steps") and Table 206 for talking ("short sentences"). Owing to the descriptive terms used in the blank the data of Table 205 are, unfortunately, not comparable with data which have been reported for unselected children. They are, however, comparable with the data for our main group of gifted subjects (Chapter VIII). The agreement with the latter is very close.

TABLE 205.

AGE OF WALKING ALONE ("SEVERAL STEPS"), HIGH SCHOOL GROUP

Months	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean
Boys	1	8	14	12	31	22	14	16	10	4	9	0	0	0	1	0	1	13.2
Girls	2	3	11	8	18	11	9	11	4	4	2	0	1	0	0	0	0	12.8

TABLE 206.

AGE OF TALKING ("SHORT SENTENCES"), HIGH SCHOOL GROUP

Months	6–11	12–17	18–23	24–29	30–35	36–41	Mean
Boys	16	44	27	19	4	1	16.7
Girls	10	33	19	5	1	0	15.5

The figures for dentition agree very closely with those for the main group, but those for walking and talking are much lower for the high school group.

The fact that a "baby book" was kept by the mother for 35 per cent of the boys and for 32 per cent of the girls is of interest in connection with the question of accuracy of data furnished by the Home Blank on this and other items of information relating to the early development of these subjects.

Organic diseases reported by teachers. Information reported by the teachers on this point is probably very incomplete and inaccurate, as health records based upon examination by school physician or school nurse were available for only 40 per cent of the boys and 71 per cent of the girls. Few indications of imperfect health were reported, and many of these were of minor importance. In all, 20, or 8 per cent, were reported for organic defects, several of which had been outgrown. These were as follows:

	Cases
Heart trouble (not described)	8
Heart trouble (slight or outgrown)	4
Indications of lung trouble	2
Apparent recovery from tuberculosis	1
Kidneys weak	1
Former kidney trouble	1
Stomach trouble	2
Asthma	1
Total	20

"Symptoms of general weakness." One or more such symptoms were reported by the home for 13 per cent of boys, 14 per cent of girls, and 13.6 per cent of total; by the school for 21 per cent of boys, 19 per cent of girls, and 20 per cent of total. The main symptoms reported under this heading have been grouped as follows:

	Reported by the Home	Reported by the School
1. Thin, slight, underweight, etc.	4	15
2. Rapid growth, lack of energy, easily fatigued, low vitality, etc.	5	8
3. Anemia, poor appetite, indigestion, biliousness, stomach trouble, etc.	2	5
4. Colds, catarrh, asthma, etc.	6	1

In addition to the symptoms listed above, the home reported one case of each of the following: subnormal temperature, tonsil trouble, headaches, bad teeth. Other symptoms reported by the school included from one to two cases of each of the following: poor color, eye trouble, legs not developed, nervous, boils, acne, overweight, imperfect recovery from injury to skull.

Vision and hearing. According to school reports, 49 per cent of the boys and 50 per cent of the girls have had the eyes tested. School reports rate the vision as follows:

	N	"Normal"	"Somewhat Defective"	"Very Poor"
Boys	154	75%	23%	2%
Girls	93	66.5%	33%	0.5%

Of boys and girls combined the school rates the vision of 27.9 per cent as either "somewhat defective" or "very poor"; the home, 22.3 per cent. Of the boys with defective vision

(home reports), 90 per cent wear glasses either part, or all, of the time; of the girls with defective vision, 75 per cent. Reports from the school agree closely with those of the home on this point.

Hearing was rated by the teachers as follows:

	N	1 "Excellent"	2 "Good"	3 "Somewhat Defective"	4 "Poor"	5 "Very Poor"	Mean
Boys	150	76	67	7	0	0	1.5
Girls	89	49	37	3	0	0	1.5

Ratings on nutrition. Nutrition was rated by the parents as follows:

	N	1 "Excellent"	2 "Good"	3 "Fair"	4 "Poor"	Mean
Boys	146	72	61	13	0	1.6
Girls	90	58	24	7	1	1.5

History of "serious digestive trouble" was reported by the parents for 15 per cent of the boys and 16.8 per cent of the girls.

Headaches. The following data on frequency of headaches were reported by the parents:

	N	"Frequent"	"Occasional"	"Rare"
Boys	122	79	42	1
Girls	76	51	22	3

Respiratory troubles. Information on "persistent mouth breathing" was reported both by parents and teachers:

	N	1 "None"	2 "Slight"	3 "Marked"	4 "Extreme"	Mean
Parents						
Boys	139	100	33	5	1	1.4
Girls	77	60	14	2	1	1.3
Teachers						
Boys	146	115	26	4	1	1.2
Girls	77	62	14	1	0	1.2

Both parents and teachers reported on adenoid and tonsil trouble, but the information of the teachers was evidently very incomplete, as they reported only about two-thirds as many cases as the parents. The following figures are based upon the information furnished by parents:

	Have had adenoid trouble	Have had adenoids removed	Have had tonsil trouble	Have had tonsils removed
Boys	46%	40%	54%	45%
Girls	47%	45%	53%	47%

Parents report as follows on the frequency of colds:

	N	1 "Rare"	2 "Occasional"	3 "Frequent"	4 "Very Frequent"	Mean
Boys	154	64	69	17	4	1.6
Girls	88	30	44	11	3	1.8

The teachers report 13½ per cent of the boys, 15 per cent of the girls, or 14 per cent of the total group, as having colds "frequently" or "very frequently." The corresponding figures for the parents' reports are almost identical: 13.6 per cent, 15.9 per cent, and 14.5 per cent.

Nervous symptoms. The question, *Is child especially nervous?* was answered affirmatively by parents and teachers as follows:

	Boys	Girls	Total
By parents	19%	17%	18%
By teachers	15%	19%	17%

The symptoms of nervousness mentioned were frequently described as slight or outgrown and belong to such types as those reported for the main group (Chapter VIII).

Parents report five boys (3.3 per cent) and no girls as having had a history of stuttering. All but one of these 5 cases are described as mild. The school reports 5 boys and 3 girls, and describes 7 of the 8 cases as mild, outgrown, or occasional.

Parents report 2 cases of chorea, both boys. One occurred at age 6 and was "very mild," the other at 7 and was "severe."

Parents report a history of "habitual muscular twitching" for 7 boys (4.6 per cent) and 4 girls (4.5 per cent).

"Marked tendency to worry" is reported as follows: by parents for 6 per cent of boys and 9 per cent of girls; by the school, for 4.5 per cent of boys and 12.5 per cent of girls. More than half the cases of worry were ascribed to causes relating to the school. There were 3 children described as overly conscientious or as having too great a desire to excel, all of whom were girls.

The parents report 6 boys (4 per cent) and 10 girls (11.4 per cent) as having a history of "marked fears." Most of these have been outgrown. Parents report 9 boys (6 per cent) and 7 girls (8 per cent) as having had night terrors, for the most part occasional or mild.

Sleep. Only 3 boys and 2 girls were reported as not sleeping well. The boys sleep on an average 9 hours and 10 minutes daily, the girls 9 hours and 15 minutes, or about a quarter of an hour above the Terman and Hocking norms for unselected children. The average time spent in bed is about 9 minutes more than this.

Contagious diseases. Table 207 gives the per cent reported by the parents as having had various contagious diseases, and the proportion of cases described as severe.

TABLE 207.

INCIDENCE OF CONTAGIOUS DISEASES IN HIGH SCHOOL GROUP

	Per cent who have had		Per cent of cases severe	
	Boys	Girls	Boys	Girls
Measles	99%	107%*	18%	16%
Mumps	48%	49%	8%	10%
Whooping Cough	82%	79%	28%	29%
Chicken-Pox	66%	72%	4%	5%
Scarlet Fever	14%	11%	20%	20%
Diphtheria	4%	3%	—	—
Typhoid	3.3%	2.3%	—	—
Pneumonia	10%	7%	—	—
Smallpox	2.6%	2.3%	—	—

* Due to repeated occurrence in the same individuals.

The fact that of these 242 children, living in one of the most healthful states in the Union, 31 should have had scarlet fever, 9 diphtheria, 7 typhoid, 6 smallpox, and 3 infantile paralysis, indicates that these entirely preventable diseases are responsible for the loss of a considerable number of gifted individuals in the country as a whole.

Accidents. Accidents of greater or less severity were reported for 47.8 per cent of boys and 24.1 per cent of girls. Bone fractures had been suffered by 13.6 per cent of boys and 10 per cent of girls.

Sexual maturity. The information on this point for the girls relates to age of first menstruation as reported by the

parents. The number having reached any given age who have matured *before* that age is as follows:

Age	10	11	12	13	14	15	16	17
Number who have reached a given age	85	85	85	80	59	40	33	19
Number having reached given age who have matured before a given age	1	1	13	34	37	37	31	19
Per cent having reached given age who have matured before a given age	1.2%	1.2%	15.3%	42.5%	62.7%	92.5%	93.9%	100%
Norms (See page 208)	0.0%	0.8%	7%	25%	60.1%	86.7%	97.5%	—

The above figures, like those given in Chapter VIII for the main group, indicate that intellectually gifted girls tend to mature considerably earlier, on the average, than unselected girls.

The question asked parents regarding age at which change of voice occurred with boys was too often misunderstood to justify a statistical summary of the replies.

Educational History

School progress. The age-grade status of the 309 children at the time they were located is shown in Table 208.

Table 208.

Age-Grade Status of High School Gifted Group

Grade	12	13	14	15	16	17	18	19	20	21	Total
IX	15	41	24	3	2						85
X	2	15	28	16	8	2		1			72
XI		1	8	15	22	13	1	1	1		62
XII			1	5	19	36	17	7		2	87
Postgrad.						2	1				3
Total	17	57	61	39	51	53	19	9	1	2	309

Regarding children who are 14 years old but not yet 16 as normally advanced for the ninth grade, children of 15 but not yet 17 as normally advanced for the tenth, etc., we

have the following percentages of retarded, normal, and accelerated progress:

	Retarded	Normal	Accelerated	Accelerated two years or more
Boys	8.5%	48.5%	43%	15.5%
Girls	0	45%	55%	15%

Kindergarten was attended by 35 per cent of boys and 33 per cent of girls, the average period of kindergarten attendance for these being almost exactly a school year. Fifteen entered school in the second grade, 7 in the third, 6 in the fourth, and 3 in the fifth. The mean age of school entrance (above kindergarten) was 6.2 years for boys and 6.4 years for girls. One child entered the first grade at 4, and 25 at 5. One entered the second grade and one the third grade at 5. One entered the third and one the fourth at 6. The detailed facts are shown in Table 209 regarding the 231 subjects for whom report was made.

TABLE 209.

AGE AND GRADE OF HIGH SCHOOL GIFTED GROUP ON ENTERING SCHOOL

	Age								
Grade	4	5	6	7	8	9	10	11	Total
I	4	25	131	37	3				200
II		1	5	6	3				15
III		1	1	3	2				7
IV			1	2	2	1			6
V					1		1	1	3
Total	4	27	138	48	11	1	1	1	231

Strictly speaking, one may consider the child retarded who does not enter the first grade before 7, the second before 8, etc. On this basis, 44 children in Table 209 were retarded on entrance. On the usual basis of figuring, which is more lenient by one year, only 3 were retarded. Of the 44 who, in the stricter standard, were retarded, there were 17 who at the time of this investigation had not made up any of this initial handicap. This shows the marked tendency to lock-step in the average public school.

If we include initial skipping (at school entrance), 68 per cent of the boys and 73 per cent of the girls have skipped one or more half grades. The boys have skipped an average of 2.8 half grades; the girls, 2.4 half grades. There were 17

children who had repeated a half grade, but none who had repeated two half grades.

According to the statements of parents, 19 per cent of the boys and 24 per cent of the girls have been encouraged to forge ahead; 74 per cent of boys and 69 per cent of girls have been allowed to take their own pace; and 7 per cent of both boys and girls have been held back. These statements refer entirely to the attitude of the parents.

Thirty-three of the children had attended two schools; 63, three; 53, four; 55, five; 28, six; and one each, seven, nine, ten, eleven, twelve, and fifteen! The average number of schools attended was 4.1.

School attendance has been fairly regular for the large majority. The average number of days lost during the past year (based on parents' estimates) was 5.8 for boys and 8.6 for girls. For girls of ages 13, 14, and 15, combined, the average loss of time was 7.6 days; for girls of ages 16, 17, and 18, combined, 9.3. The reports indicate that this increase is probably due to menstrual troubles.

Liking for school was rated by the parents as follows:

	N	Very Strong	Fairly Strong	Slight Liking	Positive Dislike
Boys	152	60%	36%	3%	1%
Girls	87	70%	28%	2%	0

The boys were devoting on an average 5.9 hours per week to the home study of school lessons at the time of the investigation; the girls, 6.8 hours. The older children of both sexes were devoting about an hour a week more to home study than were the younger children.

Of the boys, 53 per cent learned to read before starting to school; of the girls, 47.5 per cent. Four learned to read before the age of 4 years and 14 before 5 years.

The number of books in the homes from which these children come ranges from 0 to 3,500 volumes, with an average of 380. There were 24 home libraries of 1,000 volumes or more, and 15 of fewer than 50.

Fifty-seven per cent of the boys and 46 per cent of the girls had shown unusual interest in encyclopedias; 53 per cent of the boys and 23 per cent of the girls in atlases; 41.5 per cent of the boys and 34 per cent of the girls in dictionaries.

Table 210 shows the number of children of the 242 for whom reports were available who were taking private instruction in various subjects; also the parents' rating of ability shown in such instruction. It will be noted that "very superior" ability is shown in these special subjects by only 7 boys and 7 girls, or 6 per cent and 7 per cent, respectively, of the number taking special instruction.

TABLE 210.

SPECIAL SUBJECTS STUDIED AND ABILITY SHOWN BY HIGH SCHOOL GROUP

	Very Superior	Superior	Average	Inferior	Very Inferior	Total
Music:						
Boys	2	20	50	0	2	74
Girls	6	28	33	2	1	70
Dancing:						
Boys	2	3	19	2	0	26
Girls	0	2	15	0	0	17
Art:						
Boys	1	2	3	0	0	6
Girls	0	1	3	0	0	4
Language:						
Boys	2	6	2	0	0	10
Girls	1	3	7	0	0	11
Manual Training:						
Boys	0	1	0	1	0	2
Girls	0	0	0	0	0	0

The parents were asked to state what principles or rules guided them in regard to (1) answering the child's questions, (2) stimulating desire to learn, (3) other matters they had considered important in the training of their children. On the first point 212 answers were recorded, of which 187 were unreservedly affirmative—"fully," "carefully," "to the best of my ability," "thoughtfully," "seriously," "immediately," etc. The remaining were affirmative but with some qualification. In regard to (2), stimulating desire to learn, 176 answers were received, which may be classified as follows: yes, 49; no, 10; "not necessary," "showed natural ability," "was eager to learn," etc., 39; by showing pleasure at success, by commendation, encouragement, etc., 17; by exhortation on the value of knowledge, power of education, emulation of great men, etc., 12; by making work interesting, 10; by coöperating, treating as intellectual equals, etc., 8; by

providing books and material, 8; by encouraging initiative and research, 7; miscellaneous, 9.

The "other matters considered important," (3), were classified by units of response rather than by individuals; for example, "health and morals" counted as 1 under each head. There were 186 units, which have been classified as follows: religion, manners, morals, character, etc., 29; health, food, clothing, sleep, etc., 25; truthfulness, honesty, 17; supplying and supervising books, recreation, etc., 12; inculcating thoroughness, perseverance, etc., 11; treated sympathetically, as responsible, equal, etc., 11; chivalry, ideals, honor, etc., 6; social, companions, activities, fair play, 4; miscellaneous, 71.

Tests of General Information

Achievement tests were not given to the high school group. The omission was partly due to limitations of time and funds, but chiefly to the fact that few satisfactory standard tests were available in the high school subjects. The general information test, described in Chapter XI, was used instead. This test has a reliability of .95 for unselected children of the age group 14, or the age group 15, and correlates between .80 and .90 with the Terman Group Test.

The means for the separate parts of the test are shown in Table 211. As the number of girls at the various ages in the high school group is small, the sexes have been combined. Control data are available for the ages 12 and 13 (See Chapter XI) and the means of those ages for the control group are placed in parentheses for comparison.

Table 211.

Mean Scores on the Information Test by High School Group

Age	N	Science and Nature Study	History and Civics	Language and Lit.	Music and Arts	Information Total
12	13 (33)	85 (39)	73 (27)	78 (31)	35 (14)	272 (118)
13	42 (91)	90 (47)	75 (34)	79 (37)	36 (16)	282 (134)
14	45	93	78	81	38	288
15	28	99	80	82	41	302
16	33	96	81	83	40	301
17	45	99	81	80	41	302
18	13	100	81	80	39	294
19–21	8	103	83	77	38	287
Total	227	95	79	80	39	293

The above means are extremely high, as will be seen by comparison with the norms (in parentheses) for unselected children. For example, the mean total score for the 12 year old gifted group is above the mean for the control group of the same age by 2.31 times the standard deviation of the latter. The mean total for 13 year old gifted is above that of the 13 year old control group by 2.1 times the standard deviation of the latter. The mean for both the 12 year old and the 13 year old high school gifted groups is slightly higher than the mean for the main gifted groups of corresponding age. From Table 212, which gives the total score distributions for 12 and 13 year olds of (a) the high school gifted group, (b) the main gifted group, and (c) the control group, it will be seen that only one of 53 control children of 12 years reaches the 12 year mean for the high school gifted, and only two of 91 control 13 year olds reach the 13 year mean for the high school gifted.

Information quotients have not been computed for the high school gifted group, but it is evident from the data which have been presented that this group ranks as far above unselected children in general information as do the children of the main experimental group. Two of the high school gifted group obtained a perfect score in the science section of the test.

The numbers were too small to afford reliable sex comparisons, but the means showed the following tendencies:

Science and nature study, boys appreciably superior
History and civics, boys slightly superior
Language and literature, girls slightly superior
Music and art, girls slightly superior
Total score, boys slightly superior.

TABLE 212.

DISTRIBUTION OF INFORMATION SCORES OF 12 AND 13 YEAR OLDS, GIFTED AND CONTROL

	12 Year Olds			13 Year Olds		
Score	High School Gifted Group	Main Gifted Group	Control Group	High School Gifted Group	Main Gifted Group	Control Group
320–329	1					
310				2	1	
300		2		8	4	
290	1	4		9	4	
280	1	8		8	8	2
270	6	11	1	4	7	1
260		8	1	4	7	1
250	2	8	1	1	1	
240	1	10	1	3	2	3
230	1	11	1	3	1	
220		7				3
210		4				5
200		2	1			1
190						2
180			3			6
170			3			5
160			3			4
150			2			5
140			3			5
130						7
120			3			3
110			2			1
100			4			3
90			3			
80			4			6
70			4			8
60			3			4
50			2			5
40						3
30			4			5
20			2			3
10			1			
9–0			1			
Total	13	75	53	42	35	91
Mean	272.1	254.6	117.8	281.9	278.2	132.6

Scholastic Preferences

Determining the intellectual demands of the school subjects. The high school pupils, like those of the main group, were asked in the Interest Blank to rate each school subject on a scale from 1 to 5 to indicate degree of preference, also to indicate the easiest subject. Mr. Willoughby undertook to derive a scale of intelligence values of the different school subjects, analogous to the Barr Scale of intelligence values for occupations. That some school subjects make heavier demands upon intelligence than others will be generally agreed, but judges differ considerably in estimating the relative extent of these demands. Obviously, a scale of values based upon the estimates of many qualified judges will have greater validity than one based upon the estimates of a single judge. Accordingly, estimates were secured from 25 individuals (13 men and 12 women), including: one private-school teacher, graduate student in education, three years' experience; one high-school science teacher, sophomore; one sophomore, no teaching experience; two heads of psychology departments, one in a western university, the other in an eastern women's college; one private-school teacher of classics, 35 years' experience; one dean of a colored girls' seminary, 30 years' experience; undergraduate in education; two undergraduates in education, selected by the latter; one high-school teacher, experience unknown, undergraduate in education; one colored-school and army teacher, five years' experience, undergraduate in education; one undergraduate in education, selected by the latter; one college ex-president, director of a bureau of economic research; one university professor of psychology; four graduates in psychology, research assistants; one undergraduate, research assistant; one high-school teacher of science, about five years' experience; one superintendent of schools, graduate in education; one colored-school teacher, two years' experience; one high-school and one grade-school teacher, exact experience unknown but extensive; one university graduate, librarian.

Each of the twenty-five judges arranged the 48 subjects in a rank order according to the demands they were believed to make upon intelligence. The usual treatment of such data has been to assign P. E. values, directly from the rank order comparisons, according to the per cent of judges who place

a given subject higher or lower than another given subject. For example, according to Thorndike's table,[1] if 80 per cent of judges place algebra above bookkeeping, then algebra is 1.25 P.E. above bookkeeping. There are objections, however, to this method. In the case of algebra and bookkeeping, for example, when the two are compared directly, algebra is 1.25 higher, but when they are compared by comparing each with a third subject, or a third and a fourth, the previously ascertained position has moved. Another difficulty of the direct comparison method is encountered in the fact that sometimes a given subject is placed above or below another given subject by 100 per cent of the judges, in which case it is impossible to determine on this basis the P.E. distance between them. In view of these difficulties, the direct comparison method was abandoned in favor of the method of group comparison.

First, the school subject was found which had the most nearly central position with respect to all the others. This proved to be dramatics. The next step was to ascertain the distance of each of the other subjects above or below dramatics, taking account not only of the direct comparison between dramatics and the given subject, call it Subject X, but also of the position of Subject X with reference to other subjects which have been compared with dramatics. The steps were as follows:

(1) Each subject was placed in a group composed of all the subjects with which it could be directly compared. (Two subjects were "comparable," in the sense in which the term is here used, when the judges were not unanimous as to their relative positions. If 100 per cent of the judges place a given subject above another given subject, there is no way to determine the P.E. distance between them and they are not really comparable.) This gave as many groups as there were subjects, no two groups being exactly identical. The number of subjects in a group was usually between fifteen and thirty. Subject X, let us say, was comparable with twenty subjects.

(2) The next step was to ascertain the mean P.E. distance of the subjects of a given group from dramatics, the point of reference. In the case of the X group, in our illustration, the

[1] *Mental and Social Measurements*, 1913 edition, p. 123.

P.E. distance of each of the twenty subjects from dramatics was found and the mean of these distances computed.

(3) Next, the distance of Subject X from the mean of the X group was found. Suppose this to be –0.6 P.E. This added algebraically to 1.8 P.E. gives + 1.2, which is the best approximation to the true distance of Subject X from dramatics.

Carrying out this computation for all the subjects gave the P.E. values of Table 213.

TABLE 213.

INTELLECTUAL DEMANDS OF THE SCHOOL SUBJECTS

Subject	P. E. from Mean	Subject	P. E. from Mean
Physics	3.14	Grammar	0.05
Chemistry	3.14	Agriculture	0.04
Trigonometry	2.74	Dramatics	0.00
Latin	2.05	Instrumental music	–0.05
Zoölogy	1.94	Geography	–0.05
Biology	1.94	Nature study	–0.25
Geometry	1.75	Reading	–0.65
German	1.54	Bookkeeping	–0.65
Algebra	1.54	Mechanical drawing	–0.66
Botany	1.34	Painting	–1.15
Debating	1.14	Vocal music	–1.25
Composition	1.14	Modeling	–1.25
Journalism	1.04	Manual training	–1.47
French	1.04	Sewing	–1.55
Ancient history	1.04	Cooking	–1.55
Literature	1.02	Military training	–1.57
English history	0.93	Freehand drawing	–1.65
Spanish	0.84	Spelling	–1.75
General science	0.74	Shop work, tools, etc.	–1.85
Physical geography	0.64	Typewriting	–1.95
U. S. history	0.54	Games and sports	–2.45
Physiology, hygiene	0.54	Physical training	–2.55
Civics	0.44	Folk dancing	–3.05
Arithmetic	0.44	Penmanship	–3.45

Pupils' ratings of school subjects for preference and ease. By the use of the above scale of values, it is possible to compute the correlation between the absolute difficulty of subjects and the extent to which children like them or call them easy.

Each pupil of the high school group rated from 1 to 5, according to liking, the subjects which he had taken. The rating 1 meant that the subject was liked "very much"; 3,

that it was neither liked nor disliked; 5, that it was disliked "very much."

Table 214 shows the percentage of 1, 3, and 5 preference ratings for each subject, also the per cent of rated subjects which were checked as "very easy" or "easiest of all," according to the instructions on the pupils' interest blanks.

TABLE 214.

RATINGS OF SUBJECTS FOR PREFERENCE AND EASE

		Preference			
Art Group	Total Ratings	% 1's	% 3's	% 5's	% rating subject "very easy"
Freehand drawing	224	22%	24%	5%	12%
Modeling	29	21%	28%	3%	0%
Instrumental music	191	47%	13%	4%	26%
Vocal music	178	26%	22%	5%	10%
Painting	184	17%	32%	8%	9%
English Group					
Composition	285	25%	18%	3%	32%
Debating or speaking	193	34%	11%	5%	27%
Dramatics	107	58%	12%	2%	39%
Grammar	296	14%	33%	5%	28%
Literature	285	48%	14%	1%	39%
Penmanship	265	4%	35%	19%	9%
Reading	297	50%	15%	0.3%	49%
Spelling	295	26%	28%	4%	44%
Foreign Language Group					
French	105	50%	10%	4%	43%
German	25	28%	20%	8%	16%
Latin	193	32%	12%	9%	29%
Spanish	125	51%	7%	0%	50%
History Group					
Ancient or medieval	208	36%	17%	3%	35%
Civics or citizenship	223	21%	25%	4%	23%
United States History	273	32%	20%	2%	29%
Mathematics Group					
Algebra	293	50%	7.5%	4%	47%
Arithmetic	296	43%	14%	3%	41%
Geometry	210	54%	14%	3%	47%
Trigonometry	54	67%	4%	2%	52%
Physical Education Group					
Folk dancing	104	22%	19%	10%	14%
Games and sports	274	69%	5.5%	1%	29%
Military training	119	23%	18.5%	9%	22%
Physical training	290	23%	22.5%	5%	18%

	Total Ratings	Preference % 1's	% 3's	% 5's	% rating subject "very easy"
Practical Group					
Agriculture	97	13%	30%	3%	17%
Bookkeeping	44	18%	20%	4.5%	20%
Cooking	100	26%	15%	4%	22%
Manual training	172	33%	19%	5%	12%
Mechanical drawing	91	42%	12%	2%	36%
Sewing	97	25%	15%	18%	21%
Shop work	93	41%	15%	7.5%	20%
Typewriting	67	37%	15%	1%	45%
Science Group					
Botany	35	29%	8.5%	0%	26%
Chemistry	110	74%	4%	0%	47%
General science	149	44%	10%	3%	35%
Geography	275	26%	22.5%	1.5%	25%
Nature study	125	42%	22%	0%	21%
Physical geography	85	15%	34%	1%	17%
Physics	72	58%	7%	1%	29%
Physiology or hygiene	203	16%	33%	12%	19%
Zoölogy	19	32%	1.5%	0%	26%
By Groups					
Art group	806	28%	23%	5.5%	14%
English group	2025	30%	22%	5%	34%
Foreign language group	448	42%	11%	5%	38%
History group	704	30%	21%	3%	29%
Mathematics group	853	49.5%	11%	3%	45%
Physical education group	787	39%	16%	5%	22%
Practical group	761	30%	18%	6%	22%
Science group	1077	35%	20%	3%	27%
Total, all groups	7461	34.4%	18.7%	4.5%	29.4%

The mathematics group is by far the best liked and "easiest" group. Exceptionally well liked subjects in other groups are chemistry, physics, dramatics, and sports. The art group is the least liked and the hardest (for these children). The subjects most often disliked are penmanship, sewing, physiology, and folk dancing. However, 53 per cent of the pupils did not rate any subject as disliked "very much." At the opposite extreme there was only one pupil who rated no subject as liked "very much."

The correlation between the intellectual difficulty of the

subjects (Willoughby Scale values) and the per cent of 1's in the preference ratings was $+.138 \pm .099$.

The mean Willoughby Scale values of the subjects checked as "very easy" was +0.67 for boys and +0.03 for girls. The correlation between the Willoughby Scale values of the subjects and the per cent checking the various subjects as "very easy" was $-.384 \pm .081$. *That is, the less intelligence a subject demands, according to competent judges, the harder it is for these pupils, and the less they like it; the more intelligence it demands, the easier it is and the better they like it!* After all, perhaps this is the logical expectation for pupils of such superior intellectual endowment.

The relationship between the per cent who rate a subject 1 for preference and the per cent who rate it "very easy" can also be found from Table 214. The correlation (between the second column and the fifth column) is $+.753 \pm .044$. However, this rather high correlation does not tell us whether a subject is liked by a given pupil because it is easy for him, or whether it is easy for him because he likes it.

Vocational Preferences

The vocational preferences were expressed on the interest blank by 196 boys and 87 girls of the high school group. The method was the same as that used with the main group. The subject was asked to mark with two crosses the vocation he "would most like to follow" (of 96 listed), and to mark with a single cross the other occupations he "might like to follow." The first choices were distributed as follows:

	Boys	Girls
Actor	1	
Advertiser	2	
Architect	3	
Army or navy officer	2	
Artist		1
Astronomer	2	
Aviator	2	
Banker	5	
Bookkeeper or accountant	2	
Building contractor	1	
Chemist	15	
College professor	1	
Congressman	1	
Dancer		2
Decorator		1
Draftsman	1	
Dressmaker		1
Editor	3	1
Electrician	3	
Engineer: chemical	17	
civil	17	
electrical	23	
mechanical	3	
mining	6	
Explorer	2	
Factory or business mgr.	4	
Forest ranger	2	
Historian	3	
Housewife		7
Illustrator		1
Lawyer	14	1
Lecturer		1
Librarian		4
Mathematician	2	
Mayor	1	
Mechanic	1	
Merchant	3	
Mineralogist	3	
Music teacher		2
Musician: composer	1	
performer		5
singer	1	1
Nurse		1
Orator	2	
Physician	6	1
Physicist	2	
Preacher	1	
Private secretary	2	2
Psychologist	1	1
Rancher	7	
Reporter	3	3
School principal		2
Stage manager	1	4
Stenographer		1
Social worker	1	
Stock breeder	1	
Surgeon	4	2
Surveyor	1	
Teacher	1	30
Veterinary	2	
Wireless operator	3	
Writer: stories	4	6
novels	5	1
plays	3	2
Zoölogist	1	
Total	196	87

The above preferences do not tell us what occupations these subjects will follow, but they are probably fairly good indications of the *general directions* in which future choices will be made. It is significant that 33.6 per cent of the boys are looking forward to some field of engineering and 13.2 to science. Engineering and the physical sciences together account for 90 choices or almost half. Law follows with 14 choices, writing with 12, and medicine with 10. Approximately 35 per cent of the girls' choices go to teaching, 10 per cent to writing, and 8 per cent to music. The average Barr Scale rating of the occupational choices of the entire group is 14.63. This about corresponds to the level of a secretary or

high school teacher, and is on the whole lower than the majority of the group ought to aspire.

The occupations marked as possible choices cover a wide range. The boys marked on an average 3.8 occupations as possible choices; the girls, 2.2. In both cases the average Barr rating of these choices is considerably below that of the first choices. Figure 35 (page 570) shows the distribution of Barr ratings of occupational preferences of the pupils and also the distribution of the occupations followed by near relatives. The average Barr rating of (a) is 14.63; of (b), 14.1; of (c), 11.8. Average for the general male population of the larger California cities is 8.8. (See page 70.) The average for girls is lower by about one point than that for boys.

Eighty-one girls answered the question, *Do you prefer the duties of housewife to those of any other occupation?* The answers, well decorated with exclamation points and underscorings, were not in the least indecisive. The *Noes* have it, 71 per cent to 19 per cent.

Does the boy or girl whose occupational choice rates high on the Barr Scale tend to prefer the school subjects which make most intellectual demands? In order to answer this question the correlation was computed between Barr Scale ratings of preferred occupation and the Willoughby Scale ratings of scholastic preferences. The correlation found was .192, which is low but perhaps significant.

Summary

The chapter deals with a group of 309 gifted high school pupils located chiefly through coöperative surveys made by high school faculties throughout California. Final selection was based upon Terman Group Test scores earned by pupils who had been nominated by teachers. Probably most of the subjects so selected are as intelligent as the brightest in two hundred taken at random. Their ages ranged from 12 to 21, with an average of 15 years, 3.4 months. Only a small part of the information collected for the group has been summarized. Some of the more important facts are as follows:

1. The sex ratio is 183 boys to 100 girls, as compared with 116 boys to 100 girls in the main group. It is suggested that the proportion of high-scoring girls may decrease as adulthood is approached.

2. The group, as compared with the general population of California, has a deficiency of subjects of Latin, Negro, and Indian extraction, and an excess of Jewish blood. Immigration has been chiefly from northwestern and western Europe, through New England and New York, and thence through the northern tier of middle-west states to California. Barr Scale ratings of the occupations followed by the parents and other near relatives of this group gave results in line with those found for the main experimental group.

3. The mean age of fathers at the time of child's birth was 32.4; of mothers, 29.1.

4. Six per cent of the births are said to have been premature; 3.4 per cent overtime. Average birthweight reported was 8 lbs., 6.4 oz. for boys, and 8 lbs., 3.2 oz. for girls.

5. About two-thirds were exclusively breast fed for ten months or longer.

6. Average age of walking and talking, as reported by parents, is somewhat lower for this group than for the main gifted group.

7. Health and energy ratings of the subjects by parents and teachers were in the majority of cases above "average."

8. Teachers report 8 per cent as having, or as having had, more or less serious organic disease. "Symptoms of general weakness" were reported by the home for 13.6 per cent of the group; by the school, for 20 per cent.

9. The school reports 23 per cent of the boys and 33 per cent of the girls with "somewhat defective" vision, and 2 per cent of the boys and 0.5 per cent of the girls with "very poor" vision. There was no case of "poor" or "very poor" hearing.

10. The nutrition of 95.8 per cent is rated by the teachers as "good" or "excellent," by the parents, 91 per cent.

11. Almost one-half of the group have undergone tonsillectomy and about the same number adenoidectomy. Parents and teachers report 14 per cent as having colds "frequently" or "very frequently."

12. Parents rate 18 per cent as "nervous"; the teachers, 17 per cent. The percentages with a history of stuttering, habit spasms, chorea, excessive fears, or tendency to worry, run about the same as those for the main group; that is, are not excessive. The sleep records are above the Terman and Hocking norms.

13. Among 242 there had been 31 cases of scarlet fever, 9 of diphtheria, 7 of typhoid, 6 of smallpox, and 3 of infantile paralysis.

14. Roughly, half the boys and a quarter of the girls have suffered accidents.

15. The proportion of girls who menstruated before 11, 12, and 13 is considerably higher than for unselected girls.

16. More than 60 per cent of the group are accelerated in school and none seriously retarded. About 70 per cent have skipped one or more half grades. One-seventh of the group entered school (first, second, or third grade) before the age of 6. After school entrance there was little skipping.

17. These children like school and show a good record of attendance. The boys average nearly 7 hours a week in home study, the girls nearly 8 hours.

18. Half the group learned to read before starting to school, and 14 before 5 years. As in the case of the main group, there has been an excessive amount of interest in dictionaries, atlases, and encyclopedias.

19. The average number of books reported in the home library was 380.

20. The parents of these children have been guided, in general, by the same educational principles as the parents of the main group. There have been few if any attempts at prodigy making, but effort has been made to satisfy the child's natural intellectual curiosity and to hold up suitable standards of school performance.

21. In the absence of a satisfactory battery of achievement tests, a general information test was given, including items in nature study and science, language and literature, history and civics, and the arts. The superiority of the group in this test is about as great as its superiority in the Terman Group Test.

22. By modification of Cattell's "order of merit" method, a scale was derived for the rating of school subjects according to the demands they make upon general intelligence. A negative correlation of —.38 was found between the intelligence demands of a school subject and the frequency with which it was found "easy" by these pupils. On the other hand, the correlation between preferred subjects and subjects found "easy" was +.75. Such subjects as mathematics,

physics, chemistry, and modern languages were especially liked and rated easy; the manual and art subjects were least liked and least often rated as easy.

23. Nearly half of the boys are looking forward either to engineering or to science. More than a third of the girls expect to teach. The large majority of the occupational choices of both sexes fall in the professional group.

24. The results for this group are of value chiefly as confirming in almost every detail the results for the main experimental group. What has been found for both of these groups will doubtless be found to hold for any gifted group similarly selected.

CHAPTER XX

TWO YEARS AFTER[1]

The majority of the gifted children whom this report concerns were located during the school year 1921-22. Two years later, about the middle of the school year 1923–24, blanks were sent out for the first follow-up report. A blank was first sent to the parents, and after this had been returned with the information called for, another blank was sent to the child's teacher. The latter blank could not be sent until the parent's blank had been returned, giving the name of the teacher and of the school where the child was attending. Both blanks are reproduced in full in the following pages:

ANNUAL REPORT FROM PARENTS (1)

Date of this report.....

Name of child..... Present age of child.....
Name of school now attending..... City..... Present school grade.....
Name of class teacher..... Name of principal.....
Present occupation of child if not in school.....
Parent or guardian..... Address.....
This report made out by.....

I. PHYSICAL DATA.

1. Is general health apparently excellent, good, fair, poor, very poor? (Underline)
2. Is child especially nervous?.....
   Symptoms of nervousness, if any.....
   .....
3. What illness has child had during past two years? Indicate below:

Disease or illness	Date	Severity	After effects, if any

II. EDUCATIONAL AND SOCIAL DATA.

1. Liking for school (at present): (Underline)
   Very strong, fairly strong, slight liking, positive dislike. (Underline)
   If school is disliked, why?.....

[1]Written with the assistance of Florence L. Goodenough and Barbara Burks.

II. EDUCATIONAL AND SOCIAL DATA (continued).

2. Private tutoring (out of school) during the past two years:

Subject	From when to when	Hours a week, including practice	Ability shown: very superior, superior, average, inferior, very inferior
Music			
Drawing			
Painting			
Dancing			
Language			
Other subjects			

3. How has child spent leisure time during the last year?
(Examples: in games, hiking, playing alone, reading, study, hobbies, making collections, working with machinery or tools, sewing, household work, etc.)
.....
.....
.....
Give paid employment and kind.....
4. Has child recently shown any PERSISTENT interest in any particular vocation?
.....What vocation or vocations?.....
5. Has child displayed any new indications of superior intelligence since your last report?.....
If so, describe.....
.....
6. In general ability, does child appear to be gaining; holding his own; losing ground? (Underline)
Describe any change in this respect.....
.....
7. Describe child's progress in school during past two years, as to
(a) Grades repeated .....
(b) Grades skipped.....
(c) Usual school marks.....
(d) Attendance (underline): very regular, fairly regular, rather irregular, very irregular.
(e) If attendance has been irregular, give reason.....
8. Have you observed any noteworthy changes in the child during the last two years with respect to the following matters:
(a) Interests?..... Explain.....
.....
(b) Social traits?..... Explain .....
.....
(c) Character traits?..... Explain.....
.....

III. ADDITIONAL INFORMATION.

1. Have any other children been born in the family during the past two years? If so, give name, date of birth, and sex.....
.....
2. Are there any additional facts regarding family history which have come to your knowledge since your last report?.....
.....
.....
.....
3. In the remaining space add any other facts concerning this child which you think would be of interest.. .....
.....

ANNUAL REPORT FROM SCHOOL (1)

Date of this report.....

Name of child..... School grade.....

Name of school .....City.....

Teacher's name.....Teacher's address.....

This blank was filled by.....

How long have you known this child?.....

How long have you been his or her teacher?.....

Note. The information requested in this blank is being collected for about 1000 children of very superior intelligence or special talent. It is urged that the facts called for be supplied as fully as possible. The information will be held strictly confidential; it will be kept in locked files at Stanford University and will be used for statistical purposes only, without the use of names. Please omit nothing, however confidential the information requested may be or however unimportant it may seem to you. When complete data have been collected for 1000 children, the results will be of very great practical and scientific value.

This study has been made possible by two special grants amounting to $34,000, and will be continued over a term of years. Its purpose is to throw light on the factors causing mental superiority, the means by which superior mental ability may be recognized, and the methods which are suited to the education of gifted children. The school record and general development of each child will be followed for as many years as possible.

In order to avoid the danger of causing undue self-consciousness, teachers are urged not to call the child's attention to the fact that he (or she) is being studied. Do not tell the child the exact result of the mental test (mental age or intelligence quotient), or say anything about the special information which is sought in this blank. Publicity almost invariably has an unfavorable effect upon the child, and we beg you earnestly to exercise the greatest caution against giving out any information which could possibly reach the press. Even apart from the danger of newspaper publicity, it is best to avoid everything which could help to make the child a matter of comment among his teachers or acquaintances. Do not talk to the child, or to others in his presence, about his superiority. Avoid everything which could possibly stimulate vanity or self-consciousness.

I. HEALTH.

1. Is general health apparently excellent, good, fair, poor, very poor? (Underline)
2. Is nutrition apparently excellent, good, fair, poor, very poor? (Underline)
3. Is child especially nervous?.....
   Symptoms of nervousness, if any.....
4. Give any other indications of imperfect health.....
   .....
   .....

II. SCHOOL RECORD.

1. General quality of school work as compared to average child OF THE SAME GRADE:
   Very superior, superior, average, inferior, very inferior. (Underline)
2. Is deportment excellent, good, fair, poor, very poor (Underline)
3. Is application excellent, good, fair, poor, very poor? (Underline)
4. In what subject or subjects does child do best work?.....
   .....
   In what subject or subjects does child do least satisfactory work?.....
   .....
5. Could this child do work of average quality in a higher grade, if promoted now and given a certain amount of coaching on the subject matter skipped?
   .....
   If so, in what grade as highest?.....

6. Is attendance very regular, fairly regular, rather irregular, very irregular? (Underline) If attendance is irregular, give reason.....
7. Social adaptability, compared with that of average child of same age: Very superior, superior, average, inferior, very inferior. (Underline)
8. Does child play with other children very much, average amount, little? (Underline)
9. Are play interests normal?.....
   If not, explain fully.....
10. Does child respond well to discipline?.....
    If not, explain fully.....

III. ADDITIONAL INFORMATION.

In the remaining space give any other facts which will help to characterize this child or add to our understanding of his abilities, disabilities or peculiarities.

(Four inches of ruled space followed.)

Home Reports were received for 1,069 children of the various gifted groups, and School Reports for 757. Of these, 570 Home Reports and 464 School Reports were for the main experimental group. Home Reports were received before September 1, 1924, for approximately 90 per cent of the main group of 643 cases, and School Reports for approximately 75 per cent of the main group who were attending school. The latter number is smaller than the former partly because some of the children were not in school, but largely for the reason that so many Home Blanks were not returned until the end, or near the end, of the school year. The distribution of ages at the time the reports were made is shown in Table 215.

Not all of the information contained in the follow-up reports for these children has been summarized. This chapter presents only the material relating to school progress and to the testimony of parents and teachers regarding the attitude toward school, quality of school work, and changes in interests, social traits, and character traits; and most of the information summarized relates only to the main experimental group. The findings, based, as they are, upon questionnaire material, should on many points be taken as suggestive rather than conclusive. Our files contain a large amount of miscellaneous information, of semi-clinical nature, on the later development of individual children. Some of this possesses extreme interest, but the time has not yet come to attempt a summary of it. The present report is accordingly limited to the analysis of certain data for a relatively unselected group.

TABLE 215.

GIFTED CHILDREN REPORTED IN FIRST FOLLOW-UP

	Main Experimental Group				Other Gifted Groups			
	Home Blanks		School Blanks		Home Blanks		School Blanks	
Ages	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
3		1			1	1		
4	1	4			1	1		
5	4	2			1	1	1	1
6	6	3	3	2	1	3		
7	8	7	4	4	7	5	6	5
8	16	15	13	14	5	4	4	4
9	24	14	19	14	6	6	4	6
10	35	40	31	36	6	14	4	11
11	54	45	45	41	23	10	17	8
12	65	38	54	31	22	13	17	11
13	55	44	47	33	20	24	18	21
14	26	33	21	28	28	31	23	25
15	12	12	11	9	44	23	35	17
16	2	2		2	27	27	15	17
17	1	1	1	1	28	5	10	
18					31	18	4	3
19					34	8	4	
20					10	3		
21					4	1	2	
22					1			
23					1			
Total	309	261	249	215	301	198	164	129
	570		464		499		293	

AGE-GRADE STATUS IN 1924

The age-grade location of those reported at the time the reports were made is shown in tables 216 to 221. Of the main experimental group, 9 boys and 8 girls were not in school, and 1 boy was in college. Of the miscellaneous group, 31 boys and 14 girls were not in school, and 72 boys and 28 girls were in college. Data on grade location have not been obtained for those attending college.

Considering the 542 cases of Table 220 (main experimental group) with the 337 cases of Table 221 (miscellaneous group), and counting a child normal in progress who is in the first grade and is six or seven years old, but not yet eight, etc., we have the percentages of retarded, normal, and accelerated given below.

	Main Group		Miscellaneous Group		Groups Combined	
	N	Per cent	N	Per cent	N	Per cent
Retarded	0	0	3	0.9%	3	0.3%
Normal	105	19.4%	88	26.1%	193	22.0%
Accelerated	437	81.6%	246	73%	683	77.7%
Total	542		337		879	

Comparing the grade status of the entire main group in 1924 with that in 1921-22 (see page 254 ff), we find that the proportion of children accelerated has not materially changed. Of the 879 children reported in the main and miscellaneous groups combined, 1924, only 683 were accelerated and only 3 retarded, one of the latter being a "special ability" case.

TABLE 216.

AGE-GRADE STATUS OF 293 BOYS IN 1924, MAIN GIFTED GROUP

Age	1 Kgn	1 L	1 H	2 L	2 H	3 L	3 H	4 L	4 H	5 L	5 H	6 L	6 H	7 L	7 H	8 L	8 H	9 L	9 H	10 L	10 H	11 L	11 H	12 L
5	1																							
5–6																								
6		1																						
6–6			2	1	1																			
7					1	1																		
7–6						1	4		1															
8							1	1	2			1												
8–6							1	1	1	1														
9							1		1	2	6													
9–6										2	5	2	3	1	1									
10										3	2	7	1	1										
10–6												4	7	5	3	2								
11											1	1	2	8	6	2		1						
11–6												1	2	3	9	9	5	2	1					
12														1	8	8	12	4	1	1	1			
12–6															4	3	8	4	7	1	2			
13																1	5	9	8	2	4			
13–6																1	2	3	7	6	4			
14																	1		2	3	9	1		
14–6																		2	1	4	1	1	1	
15																			1	1	4	2	1	
15–6																				1	1		1	1
16																							1	
16–6																								
17																								1
17–6																								
Total	1	1	2	1	2	2	7	2	5	8	14	16	15	19	31	26	33	25	28	19	26	4	4	2

Not in school:	Ages	4	5	6	7	8	9	10	11	12	13	14	15	16			
	Cases	1	4	1			1		1		1						
In college:	Cases													1			

Table 217.

Age-Grade Status of 249 Girls in 1924, Main Gifted Group

Age	Kgn	1 L	1 H	2 L	2 H	3 L	3 H	4 L	4 H	5 L	5 H	6 L	6 H	7 L	7 H	8 L	8 H	9 L	9 H	10 L	10 H	11 L	11 H	12 L	12 H
5	1																								
5–6																									
6																									
6–6			1		1																				
7				1	1																				
7–6					1	1	1	1																	
8							1	3			2														
8–6							2	1	1	3	2														
9								1		3	2	2													
9–6											2	1	2	1											
10										1		3	7	5	1										
10–6											3	2	7	4	3	3									
11													2	8	8	1	1	1							
11–6													1	2	5	7	4	3	2						
12														1	4	8	5	2		1					
12–6																2	2	8	2	1					
13															1	2	5	6	7	1	1				
13–6																	1	5	7	4	3	1			
14																		5	2	5	2	2	1		
14–6																			2	3	6	2	2		
15																			1		1	2	2		
15–6																						2	1		1
16																						1	3		
16–6																									
17																									
17–6																								1	
Total	1	1	1	3	1	4	6	1	7	11	8	19	21	22	23	18	30	23	15	13	10	9	1	1	

Not in school: Ages 3 4 5 6 7 8 9 10 11 12 13
Cases 1 4 1 1 1 1

Table 218.

Age-Grade Status of 194 Boys in 1924, Miscellaneous Gifted Group

Age	Kgn	1 L	1 H	2 L	2 H	3 L	3 H	4 L	4 H	5 L	5 H	6 L	6 H	7 L	7 H	8 L	8 H	9 L	9 H	10 L	10 H	11 L	11 H	12 L	12 H	Post-grad.
5																										
5–6																										
6																										
6–6																										
7				1				1	1																	
7–6						2		1																		
8				1		1		1																		
8–6						1				1																
9							1		1																	
9–6							1		1				1													
10												1	1													
10–6												2	2		2											
11												1		3	3		2		1							
11–6												1		2	3	1	4	1	2							
12														3	3	4	2		2							
12–6															3		1	2	1							
13															2	2	2		4	2						
13–6																	2		5	1	1				1	
14																		1	1	4	7		2		1	
14–6																			2	2	4	2			2	
15																			3		2	3	4	1	1	
15–6																					2	6	11	3	3	
16																					1	3	4	3	4	1
16–6																							1	1	5	1
17																								2	1	1
17–6																									4	
18																					1					1
18–6																									1	
19																					1					
Total				1	1		4	3	3	2	1	5	4	8	16	7	13	4	21	9	19	14	22	10	23	4

Not in school:																										
Ages:	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Cases:	1	1	1									1	2	2	3	9	8	2	1		
In college:																					
Cases:													1	4	14	17	25	7	2	1	1

TABLE 219.

AGE-GRADE STATUS OF 143 GIRLS IN 1924, MISCELLANEOUS GIFTED GROUP

e Kgn	1 L	1 H	2 L	2 H	3 L	3 H	4 L	4 H	5 L	5 H	6 L	6 H	7 L	7 H	8 L	8 H	9 L	9 H	10 L	10 H	11 L	11 H	12 L	12 H	Post-grad.
-6		1																							
-6																									
-6					1																				
				1	1	1	1																		
-6						1																			
-6								2	1																
							1	2																	
-6										2	1			1											
										1		1		3											
-6											1	2	3	2		1									
														2											
-6													1	1	2	2									
													2	2	2	2									
-6											1		1		1	1		1							
																3	2	1	1	1					
-6															1	1	3	6		2					
-6																		2	6	4	1	1			
																		2	2	2	2	5		1	
																			1	2		3	1	1	
-6																			1	2	1	3	2	3	
																					2	2	2	3	1
-6																							2	4	2
-6																									
																		1					1	1	1
-6																									
tal	1		1	2	2	2	4	1	3	3	3	7	11	6	10	5	13	11	13	6	14	8	13	4	

t in school:

Ages:	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Cases:	1	1		2									1	2	2	1	2	1	1

College:

Cases:													1	3	4	15	3	2	

TABLE 220.

AGE-GRADE STATUS OF 542 CHILDREN IN 1924, MAIN GIFTED GROUP, SEXES COMBINED

	Grade												
Age	Kgn	1	2	3	4	5	6	7	8	9	10	11	12	Total
5	2													2
6		4	3											7
7			4	8	2									14
8				5	10	8	1							24
9				1	2	22	10	3						38
10						9	38	22	5					74
11						1	9	49	29	10				98
12								18	48	28	7			101
13								1	17	52	25	1		96
14									1	14	33	10		58
15										2	8	11	2	23
16												5		5
17													2	2
18														
19														
Total	2	4	7	14	14	40	58	93	100	106	73	27	4	542

Not in school:

Ages:	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Cases:	1	5	4	2	1		1		1		2											

In college:

Cases:														1								

TABLE 221.

AGE-GRADE STATUS OF 337 CHILDREN IN 1924, MISCELLANEOUS GIFTED GROUP, SEXES COMBINED

		Grade													
Age	Kgn	1	2	3	4	5	6	7	8	9	10	11	12	Post-grad.	Total
5		1													1
6															
7			2	5	4										11
8			1	3	3	2									9
9					5	4	2	1							12
10						1	10	10							21
11							2	15	12	4					33
12							1	14	13	6					34
13								2	11	21	8		1		43
14										8	31	13	4		56
15										3	10	31	15		59
16											1	12	24	5	42
17													7	1	8
18										1*	1		3	2	7
19											1				1
Total		1	3	8	12	7	15	42	36	43	52	56	54	8	337

Not in school:

Ages:	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Cases:	1	2	1	2								1	3	4	5	10	10	3	2		

In college:

Cases:	2	7	18	32	28	9	2	1	1

* "Special ability" case.

Only the school progress of the children in the main gifted group has been analyzed in detail. Even for this group the data are not complete, owing to the fact that the reports for about 100 children were mislaid shortly after the tabulation of results began and were not located until it was too late to include them in all the summary tables.[1] The effect of this is merely to reduce the size of the sampling; there is no likelihood that any important conclusions would have been different had the loss of data not occurred.

[1]These cases appear in tables 215, 216, 217, 218, 219, 220, and 221, but not in the other tables of this chapter.

School Progress in Reference to Recommended Promotions

It will be recalled that in the School Information Blank filled out by teachers at the time the children were located, the teacher was in each case asked to state whether in her judgment the child could do the work of a higher grade if given immediate promotion. (See page 265.) In the analysis of the follow-up reports the later school progress of those for whom promotion was deemed feasible has been compared with that for whom promotion was not thought feasible. The results are shown in Table 222, from which it will be seen that there is very little correlation between the amount of extra promotion deemed feasible in 1921–22 and the progress which has since been made.

Table 222.

Later Progress Compared with Amount of Extra Promotion Deemed Feasible in 1921-22

	Amount of Extra Promotion Deemed Feasible by Teachers in 1921–22 (Expressed in half-grades)			
	0	1	2	3 or more
1. Number recommended for each amount of promotion, 1921–22	139	198	83	25
2. Number and per cent of each group who have since made less than normal progress	5(3.6%)	7(3.5%)	0	0
3. Number and per cent of each group who have made regular progress	93(66.9%)	115(58.1%)	47(56.6%)	15(60%)
4. Number and per cent of each group who have skipped	41(29.5%)	76(38.4%)	36(43.4%)	10(40%)
5. Number and per cent of each group who have not skipped	98(70.5%)	122(61.6%)	47(56.6%)	15(60%)

Table 223 shows the number and per cent of those in various groups of Table 222 for whom extra promotion was deemed feasible by their teachers in 1924.

TABLE 223.

	No. in each Group	No. recom. for extra pro. in 1924	Amount of Extra Promotion Recommended by Teachers in 1924 (Expressed in half-grades) 1	2	3 or more
1. Not recommended for extra promotion in 1921-22	139	68			
a. Have skipped	41	23(56.1%)	15(36.6%)	6(14.6%)	2(4.9%)
b. Have not skipped	98	45(45.9%)	30(30.6%)	14(14.3%)	1(1.0%)
2. One extra promotion recommended in 1921-22	198	96			
a. Have skipped	76	39(51.3%)	26(34.2%)	9(11.8%)	4(5.3%)
b. Have not skipped	122	57(46.7%)	40(32.8%)	17(13.9%)	
3. Two extra promotions recommended in 1921-22	83	46			
a. Have skipped	36	21(58.3%)	14(38.9%)	5(13.9%)	2(5.6%)
b. Have not skipped	47	25(53.2%)	17(36.2%)	8(17.0%)	
4. Three or more extra promotions recommended in 1921-22	25	15			
a. Have skipped	10	6(60%)	5(50%)	1(10%)	
b. Have not skipped	15	9(60%)	5(33.3%)	4(26.7%)	

The facts embodied in tables 222 and 223 may perhaps be more readily grasped from the statements which follow.

Category 1—139 cases not recommended for extra promotion in 1921-22. Of these, 5 (3.6 per cent) have since made less than normal progress; 93 (66.9 per cent) have made normal progress; 41 (29.5 per cent) have skipped one or more half grades.

Of the 41 in this category who have skipped since 1921-22, 23 (56.1 per cent of the group) are now recommended for additional promotion of one to three half grades.

Of the 98 in this category who have not skipped, extra promotion is now recommended for 45 (45.9 per cent of the group).

Category 2—198 cases recommended for one extra promotion in 1921-22. Of these, 7 (3.5 per cent) have since made less than normal progress; 114 (57.6 per cent) have made normal progress; 76 (38.4 per cent) have skipped one or more half grades.

Of the 76 cases in this category who have skipped since 1921–22, additional promotion of from one to five half grades is now recommended for 39 (51.3 per cent).

Of the 122 cases in this category who have not skipped, extra promotion of one to two half grades is now recommended for 57 (46.7 per cent).

Category 3—83 cases for whom two extra promotions were recommended in 1921-22. Of these, none has made less than normal progress; 47 (56.6 per cent) have made normal progress; and 36 (43.4 per cent) have skipped one or more half grades.

Of the 36 who have skipped, additional promotion is now recommended for 21 (58.3 per cent).

Of the 47 who have not skipped, additional promotion is now recommended for 25 (53.2 per cent).

Category 4—25 cases for whom three or more extra promotions were recommended in 1921-22. Of these, none has made less than normal progress; 15 (60 per cent) have made normal progress; and 10 (40 per cent) have skipped one or more half grades.

Of the 10 who have skipped, additional promotion of one to two half grades is now recommended for 6 (60%).

Of the 15 who have not skipped, additional promotion of one to two half grades is now recommended for 9 (60 per cent).

Of the 445 children who enter into tables 222 and 223, 163 (36.6 per cent) skipped at least one half grade between 1921–22 and 1924, and 37 (8.3 per cent) skipped two or more half grades. One boy of IQ 168 skipped five half grades and is now, at the age of 9 years, in the seventh grade. In 8 cases regular progress has been made in spite of absence from school for a half year or more. Notwithstanding this record of extra progress, the teachers now recommend 221 (49.6 per cent) for still further advancement. It is especially significant that *such additional advancement is more frequently recommended for children who have skipped during the two-year period than for those who have not.*

Of the 445 children, 4 have missed promotion twice and 8 once. This does not necessarily mean that grades have been repeated by these children. In 6 of the 12 cases the child was out of school for at least half the term because of illness or travelling. In one case the child had been placed in a special school for the correction of speech defect. In 5

of the 12 cases the teacher now recommends the child for extra promotion.

It is evident from the data presented in the preceding paragraphs that such extra promotions as have been granted to these children have been bestowed in a very haphazard fashion and have borne little relation to the probable merits of the particular case.

School Progress and Scholarship Rating

In the attempt to ascertain the effect of extra progress on scholarship, difficulty was encountered from the fact that in 1921–22 teachers were asked to rate scholarship in each school subject on a scale of 1 to 7, with 4 as average, and in 1924 on a scale of 1 to 5, with 3 as average. Making the judgments "better," "same," and "worse" on the second ratings (5 point scale) as compared with the earlier ratings (7 point scale), scholarship was recorded as "same" when

(a) child having 1 on second report had 1 or 2 on first
(b) " " 2 " " " " 2 or 3 " "
(c) " " 3 " " " " 4 " "
(d) " " 4 " " " " 5 or 6 " "
(e) " " 5 " " " " 6 or 7 " "

It would have been better had the two scholarship ratings been made on the same scale. However, the fact that they were not is not very serious, since our present purpose is to compare the scholarship ratings of those who have made extra progress since 1921–22 with those who have not.

The most important facts brought out by the comparison are presented in Table 224.

It is seen (Table 224) that the pupils who have skipped since 1921–22 have gained in scholarship rating more often than those who have not skipped; also that, of the pupils who have skipped, scholarship improvement has occurred about as frequently among those who were not recommended for extra promotion in 1921–22 as for those who were. The inference is that even more extra promotions could have been granted without injury to the scholarship record of these children. The fact that somewhat more pupils have lower ratings in 1924 (compared with 1921–22) than higher, is probably due to two facts:

(1) Many are now in the upper grades or the high school, where competition is more severe

(2) The 1921–22 ratings were made by a teacher who had, in a majority of cases, nominated the child as one of the three brightest in her class. That is, the 1921–22 teacher was a little more likely than the 1924 teacher to be biased in the child's favor.

TABLE 224.

EFFECT OF EXTRA PROMOTION UPON SCHOLARSHIP

	Total Cases	Scholarship Ratings in 1924 Compared with Ratings in 1922		
		Better	Same	Worse
1. *Pupils skipping since 1922*	144	31(22%)	81(56%)	32(22%)
(a) Who were recommended for extra promotion in 1922	110	22(20%)	64(58%)	24(22%)
(b) Who were not so recommended	34	9(26%)	17(50%)	8(24%)
2. *Pupils not skipping since 1922*	254	31(12%)	161(63%)	62(24%)
(a) Who were recommended for extra promotion in 1922	170	21(12%)	108(64%)	41(24%)
(b) Who were not so recommended	84	10(12%)	53(63%)	21(25%)
3. *Grand total of above*	398	62(16%)	242(61%)	94(24%)

In the Home Report of 1924 parents were asked to state whether the child was gaining, holding his own, or losing in general ability. (See item II 6, page 598.) The answers distribute as follows:[1]

	N	Gain	No Change	Loss
Boys	284	42%	57%	2%
Girls	247	49%	51%	0%
Total	531	45%	54%	1%

The opinion of a parent on such a matter of course has little value in any individual case, but it is probably significant that, for the group as a whole, loss in general ability has evidenced itself so rarely and gains so frequently.

[1]The 100 blanks temporarily misplaced are included in these figures.

School Progress in Relation to Liking for School

Liking for school was rated by parents in the Home Information Blank (1921-22) and again in the Home Report of 1924, on the same scale, as "very strong," "fairly strong," "slight liking," "positive dislike." The Home Reports of 1924 are summarized in the following figures:

	Liking for School			
	Very Strong	Fairly Strong	Slight Liking	Positive Dislike
1. Those who have skipped in last two years:				
Boys (N=91)	51%	41%	8%	1%
Girls (N=75)	63%	37%	0	0
2. Those who have not skipped in last two years:				
Boys (N=155)	43%	51%	6%	0
Girls (N=135)	67%	31%	2%	0

The liking for school in 1924 has been compared, pupil by pupil, with that two years earlier. The following figures give the results separately for the extra progress group and for the group that had made no extra progress.

Liking for School	Extra Progress Made			No Extra Progress Made		
	Better	Same	Less	Better	Same	Less
Boys	10(12%)	51(62%)	22(26%)	29(20%)	87(59%)	32(21%)
Girls	11(14%)	48(62%)	19(24%)	16(13%)	93(74%)	17(13%)
Total	21(13%)	99(62%)	41(25%)	45(16%)	180(66%)	49(18%)

That is, the children who did not make extra progress between 1921-22 and 1924 have, as a group, not changed with respect to their liking for school, while those who received extra promotions have somewhat more often changed in the direction of less liking. The reasons for this tendency are not brought out in the data at hand, but the findings may be interpreted as an argument in favor of dealing with such children by the formation of special classes rather than by extra promotions.

School Progress and Social Adaptability

Item II 7 in the School Report of 1924 calls for a rating on social adaptability on a five point scale as very superior, superior, average, inferior, or very inferior. The results, tab-

ulated separately for those who have and for those who have not skipped since 1921–22, are given in Table 225.

TABLE 225.

SOCIAL ADAPTABILITY AS RELATED TO SCHOOL PROGRESS

		Social Adaptability (1924)					
	N	(1) Very Superior	(2) Superior	(3) Average	(4) Inferior	(5) Very Inferior	Mean
Have Skipped							
Boys	91	11(12%)	14(15%)	53(58%)	9(10%)	4(4%)	2.79
Girls	70	12(17%)	16(23%)	38(54%)	3(5%)	1(1%)	2.50
Total	161	23(14%)	30(19%)	91(57%)	12(7%)	5(3%)	2.66
Have not Skipped							
Boys	148	14(9%)	31(21%)	84(57%)	18(12%)	1(1%)	2.74
Girls	119	15(13%)	27(22%)	70(59%)	6(5%)	1(1%)	2.59
Total	267	29(11%)	58(22%)	154(58%)	24(9%)	2(1%)	2.67

The mean rating on social adaptability is almost exactly the same for the two progress groups. However, this can hardly be taken as proof that extra promotion has no unfavorable effect upon social adaptability; it is possible that the children who were somewhat better endowed in this trait were more likely to secure an extra promotion.

Most of the acceleration present in this group occurred before 1921-22. We have compared those who are accelerated with those making normal progress, in regard to the per cent rated superior, average, or inferior in social adaptability. The number of retarded is too small to yield per cents of value. The differences shown in the following figures for the accelerated and normal progress group are hardly significant.

	Rating on Social Adaptability		
Accelerated:	Superior	Average	Inferior
Boys (N=189)	28%	60%	13%
Girls (N=152)	36%	59%	6%
Normal Progress:			
Boys (N=46)	30%	54%	15%
Girls (N=34)	44%	50%	6%

Further evidence on this point was obtained by examining the ratings on social adaptability (Home Report, 1924) of 55 boys and 68 girls who were highly accelerated. The mean

amount of acceleration for these was 2.6 years for boys, and 2.4 years for girls; the mean age, 11.8 years and 11.5 years; the mean IQ, 157 and 155. The results were as follows:

	Teachers' Ratings of Social Adaptability (1924)			
	Highly Accelerated Group		Others of Main Gifted Group	
	Above "Average"	Below "Average"	Above "Average"	Below "Average"
Boys	22%	15%	30%	14%
Girls	22%	7%	44%	22%

In the School Report of 1924, teachers also rated the amount of play of each child as "very much, average amount, little." The results follow:

	Teachers' Ratings on Amount of Play (1924)			
	Highly Accelerated Group		Others of Main Gifted Group	
	"Very much"	"Little"	"Very much"	"Little"
Boys	13%	24%	22%	18%
Girls	12%	14%	21%	8%

The highly accelerated children, both boys and girls, are more likely than the less accelerated group to be rated as "below average" on amount of play. It is quite probable that this tendency of the figures is in accord with the facts, as the child who is three or four years accelerated in school finds it very difficult to enter into the plays and games of his classmates.

Case records on social adaptability and play are summarized below for the 16 boys and 12 girls who were accelerated three years or more.

Boy, age 11-5, grade 9H, IQ 164. Social adaptability average; plays with other children average amount; play interests normal; school work very superior; health excellent; not nervous. Social ratings by teacher two years ago,[1] average or slightly below. Liking for school fairly strong.

Boy, age 12-11, grade 10H, IQ 169. Social adaptability average; plays with other children very much; play interests normal; school work very superior; health excellent; not nervous. Social ratings by teacher two years ago, average or slightly below. Liking for school very strong.

Boy, age 11-5, grade 9L, IQ 159. Social adaptability average; plays with other children average amount; school work

[1]The social ratings two years ago refer to traits 11, 12, and 13—fondness for large groups, leadership, and popularity.

superior; health good; not nervous. Social ratings by teacher two years ago, average or slightly below. Teacher now comments: "He is much smaller and seems so much younger than other members of his class that he has very little in common with them." Liking for school fairly strong.

Boy, age 9-9, grade 7H, IQ 170. Social adaptability average; plays with other children average amount; play interests normal; school work very superior; health good; not nervous. Social ratings by teacher two years ago, average or better.

Boy, age 12-8, grade 10H, IQ 150. Social adaptability average; no data on play; school work excellent; health good; not nervous. Social ratings by teacher two years ago, slightly below average. Liking for school very strong.

Boy, age 12-6, grade 10H, IQ 141. Social adaptability inferior; plays with other children little; school work superior; health fair; not nervous. Social ratings by teacher two years ago, average or slightly above. Teacher now comments: "Small and frail; not able to mix with more active boys in hearty sports." Liking for school fairly strong.

Boy, age 12-4, grade 10L, IQ 165. Social adaptability average; plays average amount with other children; play interests normal; school work superior; health good; not nervous. Social ratings by teacher two years ago, low average. Liking for school fairly strong.

Boy, age 12-4, grade 9H, IQ 154. No information on social adaptability or play interests. School work very superior; health excellent; not nervous. Social ratings by teacher two years ago, decidedly above average except fondness for large groups decidedly below average. Liking for school very strong.

Boy, age 12-6, grade 10L, IQ 140. Social adaptability superior; plays with other children average amount; play interests normal; school work superior; health good; not nervous. Social ratings by teacher two years ago, above average. Liking for school very strong.

Boy, age 10-6, grade 8L, IQ 161. Social adaptability average; plays with other children average amount; play interests normal; school work superior; health excellent; not nervous. Social ratings by teacher two years ago above average. Liking for school very strong.

Boy, age 13-0, grade 10H, IQ 164. Social adaptability average; plays with other children little; play interests below normal; school work superior; health fair; nervous, "stammers at times." Social ratings by teacher two years ago, decidedly above average. Liking for school slight.

Boy, age 8-4, grade 5H, IQ 148. Social adaptability average; plays with other children average amount; play interests normal; school work very superior; health excellent; not nervous. Social ratings by teacher two years ago were: fondness for large groups below average, leadership decidedly below average, popularity average. Liking for school fairly strong.

Boy, age 10-8, grade 8L, IQ 148. Social adaptability average; no data on play; school work average; health excellent; not nervous. Social ratings by teacher two years ago were: fondness for large groups decidedly above average, leadership below average, popularity average. Liking for school fairly strong.

Boy, age 13-5, grade 10H, IQ 150. Social adaptability average; plays with other children average amount; play interests normal; school work average; health good; not nervous. Social ratings by teacher two years ago, slightly above to slightly below average. Liking for school very strong.

Boy, age 13-4, grade 10H, IQ 182. Social adaptability average; no data on play; school work very superior; health fair; no information on nervousness. Social ratings by teacher two years ago, decidedly above average. Liking for school very strong.

Boy, age 12-6, grade 10L, IQ 150. Social adaptability average; plays with other children average amount; no information on play interests; school work average; health good; not nervous. Social ratings by teacher two years ago, average. Liking for school not reported.

Girl, age 11-5, grade 9L, IQ 142. Social adaptability average; no play information; school work very superior; health good; not nervous. Social ratings by teacher two years ago, above average. Liking for school very strong.

Girl, age 12-5, grade 10L, IQ 151. Social adaptability average; plays with other children average amount; play interests normal; school work superior; health good; not ner-

vous. Social ratings by teacher two years ago, average or above. Liking for school fairly strong.

Girl, age 11-11, grade 9H, IQ 173. Social adaptability superior, play with other children not stated; play interests normal; school work superior; health good; not nervous. Social ratings by teacher two years ago, average or above. Liking for school fairly strong.

Girl, age 9-11, grade 7L, IQ 172. Social adaptability average; plays with other children average amount; play interests normal; school work superior; health good; not nervous. Social ratings by teacher two years ago, average or above. Liking for school very strong.

Girl, age 10-8, grade 8L, IQ 148. Social adaptability average; plays with other children very much; play interests normal; school work average; health excellent; not nervous. Social ratings by teacher two years ago, average. Liking for school slight.

Girl, age 10-11, grade 8L, IQ 186. Social adaptability very superior; plays with other children very much; play interests normal; school work superior; health good; "nervous at times,—blinking of eyes, restlessness." Social ratings by teacher two years ago, average or above. Liking for school fairly strong.

Girl, age 11-8, grade 9L, IQ 159. Social adaptability average; plays with other children little. "She evidently has trouble with her heart. This turns her interest away from energetic children and puts it in reading." School work superior; health good; not nervous. Social ratings by teacher two years ago, slightly below average. Liking for school very strong.

Girl, age 10-5, grade 7H, IQ 137. Social adaptability average; plays with other children very much; play interests normal; school work superior; health excellent; not nervous Social ratings by teacher two years ago, above average. Liking for school very strong.

Girl age 10-7, grade 8L, IQ 164. Social adaptability average; plays with other children average amount; play interests normal; school work not rated; health good; not nervous. Social ratings by teacher two years ago, above average. Liking for school very strong.

Girl, age 8-5, grade 5H, IQ 192. Social adaptability aver-

age; plays with other children average amount; play interests normal; school work average; health excellent; not nervous. Social ratings by teacher two years ago, average or better. Liking for school strong.

Girl, age 8-4, grade 5H, IQ 167. Social adaptability average; plays with other children average amount; play interests normal; school work not rated; health fair; nervous, runs comb through hair when reciting. Social ratings by teacher two years ago, average. Liking for school very strong.

Girl, age 11-7, grade 9L, IQ 143. Social adaptability average; plays with other children average amount; play interests normal; school work not rated; health excellent; not nervous. Social ratings by teacher two years ago, high average to very superior. Liking for school very strong.

Deportment, Application, and Nervousness in Relation to School Progress

Both in 1921-22 and in 1924 teachers rated deportment and application (each separately) as "excellent," "good," "fair," "poor," or "very poor." At both dates they also answered the question, *Is the child especially nervous?* The responses for each child in 1924 have been compared with

Table 226.

Deportment, Application, and Nervousness in Relation to School Progress

	Classification in 1924							
	Gifted Boys				Gifted Girls			
Deportment	N	Better	Same	Worse	N	Better	Same	Worse
Of those who skipped	85	38%	50%	12%	67	22%	69%	10%
Of those who did not	139	29%	55%	16%	120	28%	61%	11%
Application								
Of those who skipped	82	30%	54%	16%	67	21%	67%	12%
Of those who did not	138	20%	60%	20%	113	17%	67%	16%
Nervousness								
Of those who skipped	82	5%	87%	8%	67	3%	90%	7%
Of those who did not	138	8%	80%	12%	113	9%	86%	5%

the responses for the same child in 1921-22, and the comparison has been recorded as "better," "same," or "worse." The results are given in Table 226 separately for the children who have received extra promotions since 1921-22 and for those who have not.

The following statements are justified:

1. The deportment of both the skipping and the non-skipping group (boys and girls) showed a decided tendency toward improvement. This is more marked with the group which skipped.
2. Application in the case of both boys and girls showed a marked tendency toward improvement in the group which skipped. There was no improvement in the group which did not skip.
3. In regard to nervousness, there is a slight change in the direction of "worse," except in the case of girls who did not skip. However, the numbers showing change in nervousness are too small to be reliable.

The 1921-22 ratings in deportment and application were correlated with those of 1924. In practically all cases the second ratings were given by teachers other than those who made the first ones, and without knowledge of what the first ratings had been. For deportment the correlation was $.387 \pm .038$ for boys, and $.378 \pm .042$ for girls; for application, $.347 \pm .040$ for boys, and $.251 \pm .047$ for girls.

Health was also rated in both blanks as excellent, good, fair, poor, or very poor. The correlation between the 1921-22 and the 1924 ratings in this case was $.283 \pm .040$ for boys, and $.272 \pm .045$ for girls.

Changes in Responsiveness to Discipline

The School Information Blank of 1921-22 and the School Report Blank of 1924 both contain the following question: *Does child respond well to discipline? If not, explain.*

In tabulating the results such answers as "yes," "very well," "always," "excellently," etc., were recorded as satisfactory. Qualified affirmative answers, such as "fairly well," "yes, except for occasional periods of sulkiness," etc., were recorded as "not entirely satisfactory." No cases of incor-

rigibility or serious troublesomeness were reported in the main experimental group. The responses for 1921–22 and 1924 have been classified as follows:

	Boys		Girls	
Cases included in	1921–22	1924	1921–22	1924
each report	235	243	196	202
Satisfactory response	92%	87%	96%	92%
Not entirely satisfactory	8%	13%	4%	8%

There are 288 boys and 187 girls who appear in both the 1921–22 and the 1924 reports. Table 227 shows the number of classifications in 1924 which were different from those of 1922, and the direction of change.

TABLE 227.

RESPONSIVENESS TO DISCIPLINE, 1921–22 AND 1924

1921–22 Classification	Classification in 1924	
	Satisfactory	Not entirely satisfactory
Boys: Satisfactory	187(82%)	24(11%)
Not entirely satisfactory	10(4%)	7(3%)
Girls: Satisfactory	165(88%)	15(8%)
Not entirely satisfactory	6(3%)	1(1%)

In other words, of 211 boys classified as "satisfactory" in 1921–22, 24 are now classified as "not entirely satisfactory"; of 180 "satisfactory" girls, 15 are now "not entirely satisfactory." On the other hand 10 out of 17 boys and 6 out of 7 girls classified as "not entirely satisfactory," in 1921–22 are now classified as "satisfactory." The 7 boys and 1 girl who in *both* reports were classified as "not entirely satisfactory" are described below.

Boy, age 11-2, grade 7L, IQ 142. In 1921-22 report: responds to discipline "fairly well"; deportment "average"; application "average"; fondness for large groups "rather above average"; leadership "rather below average"; popularity, "average." In 1924 report: "he seems to bother some of his teachers very much on account of inattentiveness"; deportment "fair"; application "poor"; social adaptability, "average." On personality tests: "overstates, but not more than average"; social attitude "similar to average"; reliability in face of temptation "equal to average"; emotional stability "average."

Boy, age 12-8, grade 8H, IQ 150. In 1921-22 report: "he likes his own way"; deportment "average"; application "high average"; social traits "below average." In 1924 report: responds to discipline "fairly well"; "he seems to resent somewhat criticism of his deportment and sometimes sulks a little"; deportment "good"; application "fair"; social adaptability "average." On personality tests: "estimates his knowledge accurately"; social attitude "similar to average"; reliability in face of temptation "equal to average"; emotional stability "average."

Boy, age 11-7, grade 7H, IQ 144. In 1921-22 report: question regarding response to discipline answered "no"; deportment "inferior"; application "inferior"; social traits "decidedly above average," except popularity, which is "rather above average." In 1924 report: "he has not been disagreeable because of discipline; but he does not improve as much as one would wish"; deportment "fair"; application not rated; social adaptability "average." On personality tests: "estimates his knowledge accurately"; social attitude "very desirable"; reliability in face of temptation "more than average"; emotionally "well balanced."

Boy, age 12-10, grade 8L, IQ 141. In 1921-22 report: "Must be appealed to personally. Will not act with a group. Likes to feel responsibility but cannot carry it"; deportment "average"; application "average"; social traits "below average." In 1924 report: "resents discipline"; "passive indifference"; deportment "fair"; application "poor"; social adaptability "inferior." On personality tests: "estimates his knowledge accurately"; social attitude "similar to average"; reliability in face of temptation "equal to average"; emotional stability "average."

Boy, age 13-5, grade 9L, IQ 141. In 1921–22 report: "responds to discipline fairly well"; deportment "average"; application "high average"; social traits "above average." In 1924 report: "at times is stubborn and independent. Usually tries to makes amends as soon as he thinks it over"; deportment "fair"; application "fair"; social adaptability "inferior." On personality tests: "overstates but not more than average"; "social attitude "similar to average"; reliability in face of temptation "equal to average"; emotional stability "average."

Boy, age 13-2, grade 8H, IQ 151. In 1921–22 report: "has a very decided habit of interrupting anyone speaking, and is slow in responding to commands"; deportment not rated; application "very inferior"; social traits "average" except fondness for large groups "below average." In 1924 report: "he is never at fault; he has an alibi for all his deeds of misconduct"; deportment "poor"; application "poor"; social adaptability "inferior." On personality tests: "shows a marked tendency to overstate"; social attitude "similar to average"; reliability in face of temptation "equal to average"; emotional stability "average."

Boy, age 14-3, grade 10H, IQ 136. In 1921-22 report: question on response to discipline answered "no, has had his own way at home from infancy apparently" deportment "average"; application "superior"; "invariably avoids large groups"; "neither leads nor follows"; popularity "average." In 1924 report: "has peculiar social ideal. Will not mind mother. Minds a teacher that insists on good behavior. Resents correction until he is convinced that further delay will result in punishment"; deportment "poor"; application "poor"; social adaptability "average." On personality tests: "shows a marked tendency to overstate"; social attitude "similar to average"; reliability in face of temptation "more than average"; emotionally "well-balanced."

Girl, age 11-7, grade 8H, IQ 151. In 1921-22 report: "She likes to have her way and will try a person out. But when she minds, she soon becomes cheerful, and her grouch is soon gone"; deportment "low average"; application "average"; social traits "average" and above. In 1924 report: "is inclined to be selfish and pouty"; deportment "fair"; application "good"; social adaptability "average." On personality tests: "overstates, but not more than average"; social attitude, "very desirable"; reliability in face of temptation "less than average"; emotionally "well-balanced."

The above cases are, according to the statements of their teachers, the worst incorrigibles to be found among these 415 gifted children!

Changes in Interests and in Social and Character Traits

Item II 8 of the 1924 Home Report Blank reads: *Have you observed any noteworthy changes in the child during*

the last two years with respect to the following matters: (a) Interests? (b) Social traits? (c) Character traits? In each case the parent is asked to describe the change.

Supplementary information on these points was frequently given by parents under the following items: II 3. *How has child spent leisure time during the last year?* II 5. *Has child displayed any new indications of superior intelligence since your last report?* III 3. *In the remaining space add any other facts concerning the child which you think would be of interest.* All information from these three sources which threw any additional light on Item II 8 (changes in interests and in social and character traits) was taken into account. The answers to these questions in several dozen reports were first recorded and inspected; then a rather broad classification of interests and of social and character traits was adopted to permit a statistical summary of results.

A word of explanation is necessary as to the distinction which was made between the classification "group activities" under the treatment of changes in interests; and the classification "sociability" under the treatment of changes in social traits. When parents reported the children as having gained or lost interest in such specific group occupations as scouting, sports, games, dancing, etc., this was recorded under the heading "changes in interests." But when gain or loss in such traits as fondness for companionship or popularity was reported (i.e. sociability without such objective ends as the group activities above), this was recorded under the heading "changes in social traits." However, when tabulations were made to show the extent to which changes in interests accompanied changes in social traits, "interest in group activities," was included with "social traits" and not included with "interests."

Interests

Changes in interests were classified under the following heads:

Group activities: includes games, sports, scouting, dancing.
Religious interests: church, Sunday school, and the problem of existence.

Literary interests: reading, writing, journalism, and languages.
Scientific interests: mechanics, chemistry, science, genealogy, collections, mathematics.
Artistic interests: art, music, drama, motion pictures.
Broadly social interests: includes current events, history, civics.
Domestic and maternal interests: household tasks, sewing, cooking, love of young children.
Miscellaneous interests: all others, such as travel, school work, R.O.T.C., business enterprises, "greater breadth of interests," "greater maturity," etc.

Gains and losses were recorded separately for boys and girls under the above categories, as shown in Table 228.

TABLE 228.

GAINS AND LOSSES IN VARIOUS KINDS OF INTERESTS

	Boys (251 cases)		Girls (212 cases)	
No change reported	141 (56%)		145 (68%)	
Change reported	Gain	Loss	Gain	Loss
Group activities	47 (19%)	1 (0.5%)[1]	21 (10%)	1 (0.5%)[6]
Scientific interests	29 (12%)	—	4 (2%)	—
Miscellaneous "	22 (9%)	1 (0.5%)[2]	17 (8%)	—
Artistic "	17 (7%)	1 (0.5%)[3]	13 (6%)	—
Literary "	10 (4%)	3 (1%)[4]	15 (7%)	—
Broadly social "	6 (2.5%)	—	3 (1.5%)	—
Religious "	3 (1%)	—	3 (1.5%)	—
Domestic and Maternal "	—	—	13 (6%)	1 (0.5%)[6]

[1]"In anything that does not involve physical strength."
[2]"Interests narrowing down to a few persistent ones."
[3]"Doesn't care for movies or to be running around all the time."
[4]Do less reading.
[5]"Cares less for active games."
[6]Less interest in household tasks.

In all but 8 cases the changes in interests are in the direction of gain. The largest gain for both sexes is in interest in group activities, but gain in this interest is more frequent with boys than with girls. Boys show a large gain in scientific interests; girls, very little. On the other hand, girls more often gain in literary and domestic interests. The normal child may be expected to show a broadening and intensification of interests as adolescence approaches; the above find-

ings merely show that gifted children are not an exception to the rule. They do not ordinarily become blasé and lackadaisical.

The data were recorded in such a way as to show what combinations of gain or loss in various interests occurred. The frequencies with which a change in one type of interest occurs alone or in combination are found in Table 229.

TABLE 229.

COMBINATIONS IN WHICH GAIN OF INTEREST OCCURRED

Group activities	No. of Gains	Occurring Alone	In Combination
Boys	47	24(51%)	23(49%)
Girls	21	11(52%)	10(48%)
Scientific interests			
Boys	29	17(59%)	12(41%)
Girls	4	(?)	(?)
Artistic interests			
Boys	17	6(35%)	11(65%)
Girls	13	7(54%)	6(46%)
Literary interests			
Boys	10	3(30%)	7(70%)
Girls	15	9(60%)	6(40%)
Domestic interests			
Boys	—	—	—
Girls	13	8(62%)	5(38%)

In the case of boys, gain in scientific interests is least often accompanied by gain in other interests, and changes in literary and artistic ability most often. With boys, scientific interests seem to possess the greatest monopolizing power; with girls, domestic and maternal interests.

The numbers are too small to show whether a gain in a given type of interest tends to be accompanied by gain in a certain particular type of interest rather than in some other. It is surprising that only one case was reported in which a child had gained in any interest at the expense of interest in group activities.

Changes in social traits. The classification of changes was as follows:

Sociability: includes fondness for companions, popularity, group consciousness, etc.

Social poise: includes manners, politeness, social ease, grace.

Care for appearance: attention to dress and person.
Fondness for older company.
Leadership.
Interest in opposite sex.
Unsocial tendencies: includes fighting and teasing.
Miscellaneous.

The results (Table 230) show that all but 12 of the changes which have occurred are in the direction of gain; also that the majority of changes (and gains) fall under the category "sociability."

Table 230.

Gains and Losses with Respect to Social Traits

	Boys (251 cases)		Girls (212 cases)	
No change reported	160(64%)		153(72%)	
Change reported	Gain	Loss	Gain	Loss
Sociability	65(26%)	4(1.5%)	42(20%)	7(3.5%)
Social poise	10(4%)	1(0.5%)	4(2%)	—
Care for appearance	9(3.5%)	—	10(4.5%)	—
Fondness for older company	7(3%)	—	3(1.5%)	—
Leadership	4(1.5%)	—	2(1%)	—
Interest in opposite sex	4(1.5%)	—	3(1.5%)	—
Unsocial tendencies	2(1%)	—	—	—
Miscellaneous	3(2%)	—	2(1%)	—

Changes in Interests as Related to Changes in Social Traits

The changes in interests (not including interests in group activities) were tabulated to show whether they were accompanied by gain or loss in social traits (including interest in group activities.)

Table 231.

Changes in Interests Related to Changes in Social Traits

	Accompanying Change in School Traits		
Changes in interests	Gain	No change	Loss
Boys: Gain	45(18%)	31(12%)	—
No change	56(22%)	110(44%)	5(2%)
Loss	1(0.5%)	2(1%)	1(0.5%)
Girls: Gain	27(13%)	29(14%)	3(1.5%)
No change	33(16%)	115(54%)	4(2%)
Loss	—	1(0.5%)	—

Only three cases were reported (all girls) in which there

was a gain in interests at the expense of social traits. Of 135 children who showed a gain in interests, 72 showed also a gain in social traits and only 3 a loss in social traits. There is no evidence of any deterioration in social tendencies as a result of increase of interest in scientific, literary, artistic, domestic, and other fields.

Changes in character traits. Changes reported were classified under the following categories:

Responsibility: includes dependability, self-reliance, judgment.
Moral outlook: honesty, uprightness, truthfulness, "clean mind," etc.
Helpfulness: helpfulness, consideration, thoughtfulness, etc.
Sense of justice: love of fair play, recognition of obligations, etc.
Tractability: tractability, responsiveness to reason, and (negatively) wilfulness, argumentativeness, selfishness.
Self-control: control of temper, control of desires, patience.
Persistence and application.
Self-confidence.
Miscellaneous.

The tabulated results (Table 232) show 149 gains and 39 losses. Loss was reported for about 10 per cent of the boys and for about 7 per cent of the girls, considerably more than the proportion showing loss either in interests or in the social traits. More than half the losses in Table 232 come under the category *tractability.*

TABLE 232.

GAINS AND LOSSES WITH RESPECT TO CHARACTER TRAITS

	Boys (251 cases)		Girls (212 cases)	
No change reported	170(68%)		157(74%)	
Change reported	Gain	Loss	Gain	Loss
Responsibility	22(9%)	1(0.5%)	11(5%)	2(1%)
Moral outlook	20(8%)	—	9(4%)	—
Helpfulness	11(4.5%)	2(1%)	7(3.5%)	—
Sense of justice	9(3.5%)	—	3(1.5%)	—
Persistence and application	7(3%)	2(1%)	6(3%)	—
Tractability	5(2%)	12(5%)	5(2.5%)	9(4%)
Self-control	5(2%)	2(1%)	7(3.5%)	3(1.5%)
Self-confidence	5(2%)	2(1%)	5(2.5%)	1(0.5%)
Miscellaneous	6(2%)	3(1%)	6(3%)	—

Summary

1. Two years after the original survey a follow-up was conducted by the use of report blanks which were sent to home and school. Home Reports were received for 1,069 subjects of the various groups and School Reports for 757.

2. Data on age-grade status have been summarized for 542 children of the main gifted group and for 337 belonging to other groups. No child of the main gifted group is retarded, on the Ayres-Strayer standard, and about 82 per cent are accelerated. More than a third of the children have skipped at least one half-grade in the two-year period.

3. The gifted children who in 1921–22 were deemed by their teachers the most deserving of extra promotions have in reality skipped no more frequently since that date than the other children.

4. In 1924 additional advancement is more often recommended by the teachers for children who have skipped since 1921-22 than for those who have not.

5. Teachers' ratings on the quality of school work in 1921-22 were compared with similar ratings secured in 1924. The children who have skipped during the period more often show improvement in scholarship than those who have not.

6. Of those who have skipped, some were reported by their teachers in 1921–22 as capable of doing the work of a higher grade, others were not. The latter, nevertheless, have improved as frequently in their scholarship when granted extra promotion as have the former.

7. In the opinion of the parents, 45 per cent of the group have gained in general ability during the two years and 1 per cent have lost.

8. The group that has skipped shows, somewhat more frequently than the normal-progress group, decreased fondness for school.

9. There is no correlation between the school progress which has been made and teachers' ratings on social adaptability. However, the very highly accelerated are somewhat oftener rated "below average" in social adaptability than is true of the entire group of gifted children; they are also rated somewhat oftener as playing less than the average amount.

10. Teachers' ratings on deportment were higher in 1924

than in 1921-22. Improvement in deportment was more marked with the group which skipped than with the normal-progress group.

11. Application improved markedly in the group which skipped, but showed no improvement in the normal-progress group.

12. The data on relationship between "nervousness" ratings and skipping are not consistent.

13. Responsiveness to discipline is more often described as not entirely satisfactory in 1924 than in 1921-22. However, the worst disciplinary cases in the group studied are probably very mild in comparison with the average pupil in a parental or reform school.

14. In the two-year period the interests of these children have grown and become intensified. The largest gain is in interest in group activities. Boys show considerable gain in scientific interests, while girls have more often gained in literary and domestic interests.

15. The changes reported in respect to social traits are nearly all in the direction of increase in sociability, social poise, fondness for large groups, etc. There are very few cases in which there seems to have been a gain in general interests at the expense of the social traits.

16. In connection with character traits, gains were reported nearly four times as frequently as losses. More than half the losses have to do with tractability.

17. The data reported in this chapter are incomplete and of uneven value. Except in the case of age-grade status, the statistical summaries can be taken only as indicating the general direction in which the truth probably lies. However, even if we make considerable allowance for the unsatisfactoriness of the data, it appears that *chance factors, chiefly, have operated in the matter of extra promotions, that the gifted children have not lost in educational or general ability, and that gains have far outbalanced losses with respect to such traits as social adaptability and breadth of interests.*

CHAPTER XXI

CONCLUSIONS AND PROBLEMS

It will be recalled that the primary purpose of the investigations which have been recounted in this volume was to determine, if possible, what traits may be said to characterize children of markedly superior intellectuality. "Superior intellectuality" is here arbitrarily defined as ability to make a high score on such intelligence tests as the National, the Terman Group, and the Stanford-Binet. It is not necessary to assume that the criterion of intellectual superiority is wholly adequate, or that the superiority itself is either hereditary or abiding. The adequacy of the criterion and the degree of permanence of the superiority which has been found can later be judged in the light of follow-up studies in which the promise of youth is compared with the performance of manhood and womanhood.

Regardless of the results which such follow-up studies may yield, it is unquestionably a matter of considerable importance to ascertain the *present* traits of children earning high intelligence scores. The nature of many of these traits has been indicated in considerable detail in preceding chapters, and the numerous chapter summaries render an inclusive summarization at this point unnecessary. It remains only to bring together a few of the outstanding results of the study and to suggest problems for further investigation.

First, however, the reader is cautioned to bear in mind the variability which obtains in the so-called gifted group with respect to the various traits that have been rated or measured. The group has been described throughout in terms of the deviation of its average from the average of unselected children. It does not follow that what is true of the group is true of all its individual members. Where it could be done without unduly extending the report, complete distributions of both the gifted group and the control group have been given. Where this was not feasible the amount of dispersion from the central tendency has ordi-

narily been indicated. In most cases the amount of overlapping of the two groups can readily be computed from the data given, where such computations have not already been made.

Doubtless a more compelling realization of the lack of homogeneity of the group in physical, mental, and personality traits could be had from clinical descriptions of appropriately selected cases. At another time it may be possible to prepare a series of case studies; their exclusion from the present volume has been a matter of necessity.

The validity of the generalizations made regarding the traits which characterize gifted children hinges upon the representative nature of the group studied. We have been at considerable pains to insure that the group would not be to any considerable extent unrepresentative of that entire portion of the child population which is capable of earning an intelligence quotient of 140 or above. We believe that our efforts in this direction have been reasonably successful. It is unlikely that more than 20 per cent of the cases have been missed, out of the total number of children who could have qualified in the school population canvassed. The loss may not have exceeded 10 per cent. Granted that the cases missed might for some traits have yielded distributions differing appreciably from those actually found, there is no likelihood that their inclusion would have modified in any important respect the nature of the conclusions that have been drawn. So far as the traits which have been measured are concerned, one is justified in believing that the characterizations which hold for the experimental group hold for gifted children in general.

It is perhaps more important to bear in mind the limits of the field covered by the various tests and measurements that have been applied. For example, it cannot be supposed that the intelligence of our subjects has been measured in all its aspects by the two intelligence tests used, that the full scope and depth of interests have been measured by the interest data, or that the available samplings of character and personality traits tell all it would be worth while to know about this group of trait-complexes. The twenty-five traits which have been rated by the parents and teachers are so many out of possible hundreds, although it is hoped they

are among the most important. The physical measurements and medical examinations were exceptionally complete, but they leave altogether untouched a great many things that one would like to know about the physical correlates of superior mentality.

Nevertheless, incomplete and fragmentary as our data are when compared with the many-sided richness of a child's total mental and physical equipment, it may justly be claimed that they carry us well beyond the bounds of previously established fact. Character analyses and case descriptions based upon the subjective evaluation of the best data to be had from ordinary observation can never take the place of quantitative measurements even of the cruder sort. If our data are incomplete, they are at any rate, for the most part, objective and verifiable. No degree of completeness could possibly make good the fault of subjectivity and unverifiableness. If the methods that have been employed have at times led to erroneous conclusions, these in time will be discovered and corrected. One who suspects error at any point has only to apply the same or demonstrably better objective methods to test the justness of his suspicions. It is to be hoped that sooner or later all our conclusions will thus be put to trial. The ultimate value of our study will be measured more by the investigations which it stimulates or provokes others to make than by the amount of its factual data that later experiments may verify.

What are the outstanding characteristics of this group of gifted children? Space is available for mention of but a few, and the temptation to extended discussion must be resisted.

The group contains an unexpectedly large proportion of cases in the upper IQ ranges. Assuming the standard deviation of the IQ distribution for unselected children to be between 15 and 18, there is an appreciable excess of 150 IQ cases, or better, over and above the theoretical expectation. Above 160 IQ the number of cases found increases out of all proportion to the theoretically expected number and by IQ 170 exceeds it several times. Unless this discrepancy can be explained as due to the imperfection of the IQ technique it would appear that the distribution of intelligence in the child population departs considerably from that described by the normal probability curve.

The group contains a significant though not overwhelming preponderance of boys. This finding is not in harmony with any expectations that could be based upon a comparison of the mean scores earned in intelligence tests by unselected boys and girls of corresponding age. No thoroughly convincing explanation can be formulated from the data at hand, although an examination of various hypotheses suggests that the cause may possibly lie in the greater variability of boys. The fact that the excess of boys over girls is far greater in the high school group than in the younger gifted group raises the question whether the mental growth of boys tends to continue somewhat beyond the level which marks the mental maturity of girls.

In physical growth and in general health the gifted group unquestionably rates on the whole somewhat above par. There is no shred of evidence to support the widespread opinion that typically the intellectually precocious child is weak, undersized, or nervously unstable. Insofar as the gifted child departs at all from the average on these traits it is pretty certainly in the other direction, but the fact seems to be that his deviation from the norm on physical traits is in most cases very small indeed in comparison with his deviation in intellectual and volitional traits. Even the slight superiority that he enjoys with respect to physical equipment may or may not be due primarily to endowment. It might be accounted for mainly if not entirely by such factors as diet, medical care, and other environmental influences.

To explain by the environment hypothesis the relatively much greater deviation of our group from unselected children with respect to intellectual and volitional traits appears difficult if not impossible. Our data, however, offer no convincing proof, merely numerous converging lines of evidence. There is a marked excess of Jewish and of Northern and Western European stock represented. The number of highly successful, even eminent, relatives is impressively great. The fact that in a State which justly prides itself on the equality of educational opportunity provided for its children of every class and station an impartially selected gifted group should draw so heavily from the higher occupational levels and so lightly from the lower, throws a heavy burden upon the environment hypothesis. In spite of all our

effort to equalize educational opportunity, the 10 year old child of the California laborer competes for high IQ rank no more successfully than the laborer's son competed for the genius rank in Europe a hundred years ago. This statement is based upon a comparison of the relative number in our group and in the Galton-de Candolle-Ellis genius-groups of individuals whose parents belonged to the unskilled or semi-skilled labor classes. Previous studies had only demonstrated the superiority of the higher occupational and social class with respect to the number of finished geniuses produced, and it was only natural that many should prefer to explain this superiority on the ground of educational opportunity. We have demonstrated that the superiority of the same occupational and social classes is no less decisive when the compared offspring are at an age at which educational opportunity is about as nearly equalized as an enlightened democracy can make it.

Two possible environmental causes of the intellectual superiority of our gifted group are definitely excluded by the data that have been presented: (1) formal schooling, and (2) parental income. It has been shown that within a given age group, the intelligence and achievement scores earned are totally uncorrelated with length of school attendance. The median family income does not greatly exceed that for the general population of the cities in question. The families of some of our most gifted subjects are in financial circumstances below the level of moderate comfort. * In a majority of cases the superiority of the gifted child is evidenced at a very early age. Among the most commonly mentioned indications are intellectual curiosity, wealth of miscellaneous information, and desire to learn to read. The frequent presence of such traits among our subjects in the pre-school period suggests strongly the influence of endowment. Although in a small minority of cases attempts at forced culture may have contributed to the result, it is manifestly impossible to account for the general superiority of the group by any such influence.

There are, nevertheless, many persons who believe that intelligence quotients can be manufactured to order by the application of suitable methods of training. There are even prominent educators and psychologists who are inclined to

regard such a pedagogical feat as within the realm of possibility, and no one knows that it is not. If it is possible it is time we were finding it out. Conclusive evidence as to the extent to which IQ's can be artificially raised could be supplied in a few years by an experiment which would cost a few hundred thousand or at most a few million dollars. The knowledge would probably be worth to humanity a thousand times that amount.

Although a majority of our children have had the advantage of superior cultural influences in the home, their more formal educational opportunities have been entirely commonplace, in no way superior to those enjoyed by the children from the humblest families of Los Angeles, San Francisco, and Oakland. At school they have studied and played with the children of the generality. The school has provided for them no special program of instruction. It has given no form of individual treatment except an occasional extra promotion. Such promotions have usually been doubly or trebly earned, for it has been demonstrated by reliable and extensive achievement tests that the average child of our group had already mastered the subject matter of the curriculum two or three grades beyond that in which he was located. More accurately, this promotional "slack" amounts on the average to about 25 per cent of the child's age. Perhaps because of this fact, the superiority of the group in achievement is only two-thirds or three-fourths as great as its superiority in intelligence. It is evidently a rare experience for a gifted child to be given work of a grade of difficulty commensurate with his intellectual abilities.

The excess in achievement above the norm for the gifted child's actual grade status is general rather than special, although it is somewhat less marked in spelling and arithmetic than in general information, reading, and language. The amount of specialization or unevenness in the abilities of our group was made the subject of extended study by Dr. De Voss. His results show that in respect to measurable disparity of abilities the gifted child differs little if at all from children in general. The "one-sidedness" of precocious children is mythical. The fact is that a considerable proportion of all children show appreciable specialization in their achievements. The gifted child has only his share of this

common human trait. Nevertheless, the measurable disparities found are such as to show clearly the necessity of taking them into account in any scheme of vocational or educational guidance for children of every grade of intelligence. It will be one of the important problems in the follow-up of these gifted children to work out the degree of correlation between the specialized achievement in adult life and the special aptitudes discovered in this investigation.

The matter of interests was deemed of sufficient importance to warrant investigation from several angles. As would be expected, the interests of gifted children reflect in many ways their intellectual superiority. The school subjects which they like best are for the most part the subjects which unselected children find the most difficult. The vocations which they prefer rank fairly high in the occupational hierarchy with respect to the intellectual demands they make.

The reading of gifted children surpasses that of unselected children both in quantity and quality. The typical gifted child of seven years reads more books than the unselected child reads at any age up to fifteen years. Gifted children have more than the usual interest in books of science, history, biography, travel, and informational fiction, and less in books of adventure, mystery, and emotional fiction.

The common opinion that intellectually superior children are characterized by a deficiency of play interests has been shown to be wholly unfounded. The mean play-information quotient of the gifted group is 136. The typical gifted child of nine years has a larger body of definite knowledge about plays and games than the average child of twelve years. If he devotes somewhat fewer hours per week to play activities it is because his play interests must compete with a wealth of other interests which are no less compelling. Another finding of considerable importance in this connection is that the play interests of the gifted boy are above rather than below the norm in degree of "masculinity."

The experiment carried out for the purpose of measuring the strength of interests along intellectual, social, and activity lines is perhaps one of the most significant reported in the entire study, whether considered from the point of view of methodology or results. It is probable that the type of instrument which Mrs. Wyman designed for this purpose

will be found capable of unlocking many hitherto inaccessible regions of human personality and interest. Adaptations of her method might be devised which would aid in the discovery of special aptitudes and in the diagnosis of pre-delinquent and pre-psychotic tendencies. In the present instance the Wyman test has given a fairly precise measure of three important aspects of interest. It has shown that in strength of intellectual interest 90 per cent of our gifted children surpass the average of a control group, that the superiority of the gifted in strength of social interests is well-nigh as great, and that in activity interests the two groups are practically indistinguishable.

That our gifted surpass unselected children in tests of honesty, trustworthiness, and similar moral traits, will probably surprise no observant judge of human character. Few have ever denied that there is at least a certain amount of positive correlation between intelligence and character. The Cady-Raubenheimer tests show that it is considerable. Considering total score on the seven character tests used, one can say that the gifted child of nine or ten years has reached a stage of moral development which is not attained by the average child until the age of thirteen or fourteen. Approximately 85 per cent of the gifted surpass the average of unselected children. The test results on this point are confirmed by the testimony of special class teachers of gifted children. The tests in question are measures of untrustworthiness, of dishonesty of report, of tendency to overstatement, of objectionable social-moral attitudes, and of interest in questionable books and questionable companions.

A modification of Woodworth's test of psychotic tendencies showed approximately 75 per cent of the gifted above the average of unselected children. Comparison of later mental troubles and conduct disorders with the results of these tests will be of surpassing interest.

It should be emphasized, however, that one could find in the gifted group numerous exceptions to the general rule with respect to character, personality, and emotional stability. The gifted are not free from faults, and at least one out of five has more of them than the average child of the general population. Perhaps one out of twenty presents a more or less serious problem in one or another respect.

The ratings secured from parents and teachers on the twenty-five mental, moral, social, and physical traits are of value chiefly in their confirmation of the results secured by the method of test. These ratings undoubtedly have a very low reliability for an individual subject, but when used as a basis for comparing the relatively large gifted and control groups they yield reasonably dependable results. For example, one can say with considerable assurance that gifted children excel the average most of all in intellectual and volitional traits, next in emotional and moral traits, and least in physical and social traits.

The purpose and form of this report have tended almost inevitably to center attention upon the traits of the gifted group rather than upon the control groups with which they have been compared. To an extent this is unfortunate. A volume could well have been devoted to fuller treatment and discussion of the data collected for unselected children, including sex and age differences in each of the following: scholastic and occupational interests, play interest and play information, reading interests, teachers' ratings of scholastic abilities, interest tests, character and personality tests, and ratings by teachers and parents on the twenty-five selected traits. The reader who is interested may assemble for himself the most essential data on these points from the various chapters of this report; lack of space has prevented our performing this service for him. Special attention is called to the significance of such data as the age and sex differences disclosed by the interest and personality tests and by the twenty-five trait ratings. On these and other traits important data are to be found on the relative variability of the sexes, especially on pages 475, 508–512, and 537–538. Examination of these data will show that the evidence on variability is inconsistent and therefore inconclusive.

A study of superior talent inevitably raises a host of pedagogical problems. It has been no part of our purpose, however, to exploit any theory as to the educational methods best adapted to the gifted child. About the culture of genius next to nothing is known, although new light may in time be expected from the rapidly increasing experimentation with differentiated curricula, classification by ability, and methods of individual instruction. Traditional methods

have ignored the problem; their influence is negative rather than positive; the best that can be hoped for them is that they may not be as bad as they seem. The present neglect of superior talent is sufficiently indicated by the inability of teachers to recognize it. One of the most astonishing facts brought out in this investigation is that one's best chance of identifying the brightest child in a schoolroom is to examine the birth records and select the youngest, rather than to take the one rated as brightest by the teacher.

Follow-up data covering the first two years after the subjects were located are encouraging. Grade progress and quality of school work indicate that general ability is being fully maintained. The previous good record of school deportment has been improved, and difficulties in the field of social adjustment are clearing up. It is probably very significant that the children who received the greatest number of extra promotions are in general the ones whose school work has most improved in quality.

Prediction as to the probable future of these children would be profitless. We can only wait and watch. It should be pointed out, however, that to expect all or even a majority of the subjects to attain any considerable degree of eminence would be unwarranted optimism. In the first place, eminence is a poor measure of success. In the second place, success even in the best sense is largely a product of fortunate chance combinations of personal merits and environmental circumstances. In the third place, the group itself, although far superior to the average, is nothing like as highly selected as the groups of genius-adults studied by Galton, de Candolle, Ellis, Castle, Cattell, and others. Each of Galton's subjects, for example, ranked in eminence at least as high as the first in four thousand adults of the general population. To qualify for our gifted group it was only necessary for a child to rate as high as the first in two hundred. Only about one of our subjects in twenty, or about fifty in the group of one thousand, would rank as the first in four thousand of a random selection. About one man in a thousand in the generality finds his way into *Who's Who*. Twenty per cent of our boys rank as high in IQ as the first in a thousand taken at random, but we should hardly expect so large a proportion to attain *Who's Who* distinction. Perhaps no one

would contend that this or any similar type of eminence is more than moderately correlated with general intelligence. In a city of 25,000 population there are, say, 5,000 males above the age of thirty years. It is with the most distinguished 25 to 50 of such a group that our gifted boys could be most fairly compared a few decades hence.

It is hoped that some of the later volumes which are planned for this series of *Genetic Studies of Genius* will add at least something to our present knowledge about the origin of exceptional talent, the methods of culture adapted to insure its fullest development, and the social and governmental policies that will conserve and utilize it to the best advantage of all. These are the great problems of genius; they are outranked in importance by few if any of the issues that confront mankind; they cannot be solved except in the light of psychological, biological, and educational researches along lines that are still almost wholly unexplored.

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DISCARDED